

FLORIDA MULLET CANNING HELPING TO STABILIZE PRICES
FOR FISHERMEN

Anonymous
National Fisherman 38, 16, 41 (September 1957)

A more stable market for the Florida mullet catches has been developed as a result of a new mullet-canning plant that was opened last season at Fruitville, near Sarasota. This is the first commercial enterprise to successfully can mullet.

Long confined to the fresh-fish market, with a limited amount sold for smoking, the price of mullet has fluctuated widely in the past causing mullet fishing to be a precarious method of making a living. Declining demand for the fresh product forced mullet prices to low levels. An attempt is being made by the Florida Board of Conservation to improve the marketing situation by conducting an advertising campaign, which includes the introduction of canned mullet at snows and to home-makers via sheets of recipes.

About 63 million pounds of Florida mullet is available annually. Black mullet, which spawn in the late fall, is the only species canned. These fish are cold packed into 15-ounce cans, which requires about 1.6 pounds of the round fish per can.

The mullet, a firm, white fish of agreeable flavor and texture, now is selling for around 59 cents a can. Frozen mullet fillets, breaded and ready to cook, and white mullet roe are being test-marketed. Future operations may also include mullet chowder and smoked mullet.

Florida produces 75 percent of all mullet caught in the United States, and there appears to be an abundant supply. Mullet feed on minute algae. They spend most of their life in the coastal bays

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2, 1121	THE GRANTON TRAWL PART 6: THE WIRE WORKING GEAR	ABSTRACTER: Kathryn L. Osterhaug
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Iron bobbins have replaced those made of wood for use in deep-sea trawling. They are used to prevent the net from catching on the sea bed, and help the trawl to fish correctly.

The iron bobbins are spherical in shape with a hole through the center large enough to allow an eye splice of a 3/4-inch circumference wire rope to be rove. These bobbins vary in size from 14 to 34 inches in diameter. Fifteen iron bobbins is the usual number worked, the most popular pattern being five 24-inch or seven 21-inch bobbins along the bosom, and five 21-inch or seven 18-inch bobbins along each punt.

The following component parts are needed in order to "fix a set of bobbins":

Iron Becket bobbins: These are iron, shaped as shown in figure 1 (see over), with a hole through the center of each. Each becket bobbin has an iron ring or a wire grommel for securing the bobbins onto the fishing lines. The becket bobbins are threaded, two between each large bobbin, along 20-foot bobbin wires. **Bobbin wires:** These are of steel wire rope of 6/19's construction, 2-7/8 3-1/4-inch circumference and 20-foot length, with an eye spliced at each end. Quarter rope is strips: Two of these are used with the trawl. These strips, onto which the quarter ropes will be joined, help, with the addition of a swivel, to prevent the quarter rope from twisting or kinking. The belly-line legs: These are of 6/12's construction and 1-3/4-inch circumference wire rope, and are 13-1/2 feet in length. Their function is to take the main weight from the net and transfer it to the bobbins. **Wing bobbins:** Three sections of iron bobbins cover the bottom and the two 20-foot bunts. Protection also is needed by the net that is supported by the two 14-1/2-foot fishing lines along the fore and after wings. This protection must be light, but durable. This is provided by four 14-1/2-foot lengths of 2-5/8 3-inch circumference, 6/12's construction wire rope with an eye spliced at each end, and with hard rubber discs or bobbins threaded tightly along each length. These discs are 4 to 6 inches in diameter.

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CANNED MULLET

THE GRANTON TRAWL

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DOUBLE-RIG TRAWLING

CORROSION PROTECTION

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2.1121

A MAJOR TREND TO DOUBLE-RIG TRAWLING GEAR

Anonymous
Southern Fisherman 17, 72-73, 81 (September 1957)

At Ft. Myers Beach, Florida, a new 55-footer, the Hustler, has been outfitted for double-rig fishing. She is designed and built for inshore fishing. Power is supplied by a 6-71 diesel equipped with a 4½ to 1 reduction gear. On her longer trips the boat will benefit from the two inches of foam insulation installed under her decks.

The new boat is fishing two nets. One is a 43-foot flat net, and the other a 40-foot four-seam balloon trawl. Doors are of conventional type, 8 feet by 40 inches and are rigged with standard 3/8-inch chain. Each trawl is fished with a single 3-inch trawl cable, and a 50-foot bridle runs from the trawl cable to the doors. The outrigger trawling booms are each 24 feet long, of 4-inch 3-drum galvanneal pipe. Special extra-wide blocks were obtained for handling the trawl cables. A 3-drum winch is equipped with an extra gypsy head for handling tow lazy lines.

The basic idea is simple enough. Two 40-foot trawls cost less than one 80-foot trawl and, if one is lost on bad bottom, the vessel still can fish and hasn't suffered a major financial loss. Furthermore, oldtimers have always maintained that a 40-foot net caught "better" than any larger net, size for size, possibly because the bight in the bottom of the lead-line "sets up" the shrimp just right to be taken in the net. One other theory is that the water resistance of two 40-foot trawls is less than that of a larger net, and the vessel actually drags at a faster speed over the ground. This is borne out by practical observations in Texas. A 120 hp engine will tow a large shrimp net at 900 rpm, and the engine will be lugging, fishing two small nets the same engine will tow at 900 rpm.

The two-trawl rig nets are fished like oversize try nets, one from each boom. The booms are made of heavy duty pipe, generally $4\frac{1}{2}$ inches O.D. with a wall thickness of from $3/8$ to $\frac{1}{2}$ inch. The ladder or ratlines commonly found on the port quarter are moved around and run from the center of the trawson to the tip of the boom. The boom is further firmed up by two stays running from the

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2.113 THE PROTECTION OF PLANT AND EQUIPMENT AGAINST ATMOSPHERIC CORROSION

Anonymous
Chemistry and Industry No. 24. 754-755 (June 15. 1957)

This is a report of an address given by Dr. J. C. Hudson of the British Iron and Steel Research Association before the Liverpool Section of the Society of Chemical Industry on April 5, 1957.

Satisfactory protection of steelwork could be obtained by painting provided attention was paid to the correct principles.

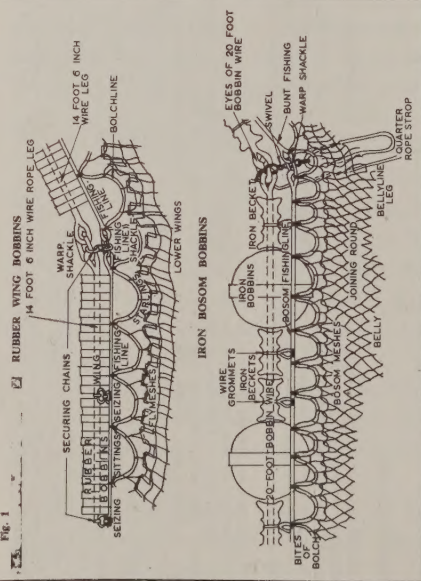
Design should be such that all surfaces are accessible and easy to paint and features leading to the accumulation of dust and water should be eliminated. If all steelwork could be painted very soon after it had left the steel mills, protection for 7 to 10 years could be achieved with very little surface preparation. Normally, however, this is out of the question and treatment of the surface to remove rust and mill scale loosened by rusting is a critical factor in the subsequent life of the paint film. The effectiveness of the treatment is determined by the extent of the removal of the rust and scale. The most efficient processes are grit- and sand-blasting or picking which give paint lives of 7 to 10 years. They are best applied to new steel but, with care might be satisfactorily applied to steelwork that had become heavily rusted after being out of the mill for a long time before preparation and painting. Hand- and power-scrapping and wire-brushing or chemical treatments, e.g. with phosphoric acid-based materials, are the least effective and give paint lives of 4 to 6 years. When water-based paints are used, the paint life is reduced to 2 to 4 years. Flame-cleaning gives even better results, with paint lives of 4 to 6 years.

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Reprinted in part

6 inches in diameter, about 2 inches wide and have a hole in the center. At intervals between these discs small "hand-cuff" chains are threaded for joining the wing bobbins onto the fishing lines.

Fig. 1



and inlets of Florida and seldom migrate over a distance greater than 20 miles.

As regards the painting scheme, the choice of the priming paint is the most important factor. An inhibitive priming paint, such as red lead, zinc chromate or calcium plumbate, which chemically inhibits corrosion, gives results up to 50% better than the noninhibitive primers though with good surface preparation the differences were much less marked. The differences between the various types of finishing paints are also not very great though the protection tended to increase in the order: linseed oil, stand oil, alkyl resin, phenolic resin, epoxy resin, vinyl resin. The epoxy-resin paints had not been under rigorous test for a long enough period for their possible merit to be fully evaluated. The duration of the protection is in general longer the greater the paint film thickness, but even a very thick film cannot compensate for poor surface preparation. A thickness of about five thousandths of an inch, i.e. about four hand-brushed coats, is necessary in U. K. conditions.

Rusting occurs only at relative humidities above 70% and is hardly serious below 85%. Examination of humidity charts shows that in most localities in this country painting of steelwork should, therefore, be confined to the period April to September. Brushing is in general preferable to spraying; if brushed, where bad weather during painting might reduce the protection from five to three years if brushed, with spraying it might reduce the protection from five years to one year. Spraying is also less effective than brushing when the prior surface preparation has been poor. Frequently a compromise is adopted, the first coat of paint being brushed and subsequent coats sprayed.

To achieve the minimum maintenance cost, steelwork should be repainted just at the time the paint has failed. If repainting is delayed, the cost of surface preparation rises sharply with an ordinary steel with a metal-sprayed steel the rise is much less sharp because the underlying metal is very little affected even several years after the paint film has failed.

tip of the boom to the usual side-stays amidships. The length of the boom varies, but generally approaches 24 feet. In the vertical position, the tip of the boom just about reaches the mast cross-trees. Horizontally, the boom topping lifts are set so that the tip of the boom is 10 to 12 feet off the water in calm water, to eliminate dipping under in heavy weather.

The usual 7/16 or 1/2-inch wire trawl cables are used. The top drum of the winch serves the port trawl, the bottom drum handles the starboard trawl, and the center drum is reserved for the try net.

In Texas two major types of trawl blocks are used. One is a manufactured model designed for 1-inch wire rope with roller bearings and good grease capacity. The other is made from 15-inch automobile wheels cut down and enclosed in a housing. The wide 5-inch face of this latter block handles such things as bridges and thimbles without trouble, and has good bearing and grease characteristics.

The try-net davit can be eliminated entirely by fishing the try net off the starboard outrigger boom from a block set inboard of the trawl block. Or the davit can be moved to the starboard quarter. Generally the try net is fished on the "long" side.

One net is fished 25 fathoms behind the other. The "long" net is set and paid out until the end of the bridle passes through the block; then the other, or "short" net, is set and both nets released simultaneously. When the desired length of cable has been paid out on both nets, the winch is braked to a stop and dogged off. Meanwhile the vessel has been running on a straight auto-pilot course. The nets are hauled simultaneously until the short side doors come up to the block; the crew picks up the lazy line using a long (20-foot) boat hook. With lessened drag on the short side, the vessel turns away from the long side and this net's lazy line is secured in the same way. Two gypsy spools on the winch are almost mandatory.

It appears that the two-trawl system is more productive to owner and crew alike. It involves less work for the crew and is safer for the crew than the single-trawl rig. It minimizes financial loss when gear is destroyed. The number of boats planning to convert to this new system offers ample evidence that these characteristics are prized by the industry.

2.1128 SOME ASPECTS OF POTTING

Noel, H. S.
World Fishing 6, 59-63 (September 1957)

In an industry that is distributed along the entire length of the British coastline, it is to be expected that a variety of gear would be in use for the taking of any one type of shell fish. Little variation, however, has been found in the overall efficiency of differing types of pots and creels.

Crab fishing.--The traditional single-entry, beehive pot are still popular in some areas. In Cornwall, for example, they are made of split withies and are of considerable size. Such pots, of course, require ballast, usually in the form of stones, but do not have the disadvantage of net covering, which is liable to rot and damage. The fact that losses by storm are frequent on this coast may be a further factor in this pot's favor, as they can be made by the fishermen from easily obtained materials.

At the Norfolk crabs of Sheringham and Cromer, the double-entry creel or bow pot is favored. It is somewhat smaller than a standard lobster pot, is covered with sisal or nylon net, and incorporates flat steel bars in the wooden base for ballast. The pots are homemade and each boat floats a fleet of about 80 pots, baited with salt herring. The fish are banded and each boat floats a smaller creel of about 1-pound weight in the bulk of which go to market alive. Bait is retained between two stretched pieces of twine and a small creel, which are not tar-dipped as is usual. A "door" on top of the pot is used for emptying.

Lobster fishing.--The standard creel with few variations, is generally used in the lobster fishery. The lobster is catchable size after about 6 years, when it measures 9 inches from beak to tail. As with crabs, the season runs from spring to autumn, but the lobstermen are sometimes stored for later sale in "ponds" or "keeps." The keep is a floating box with a lid, moored in clean, moving sea water, and lobstermen may be kept in them for periods up to 3 months.

The two main exceptions to the standard creel are the lightweight and the collapsible pots. The

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ABSTRACTER: Kathryn L. Osterhaug

2.114 SAVING TIME, MUSCLE, MEN, AND FISH ON BRISTOL BAY

Anonymous
Pacific Fisherman 55, 16 (August 1957)

Elimination of time-loss in unloading to as large a degree as possible is one of the primary present objectives of Bristol Bay salmon operators and fishermen, for every hour of fishing in a week, which may be less than two days' long is of great importance.

Furtherance of this move for profits through reduction in time lost to fishing, led to the development on an interesting item of vessel equipment this season by a Seattle firm, and its installation aboard three Bristol Bay power scows.

This new gear, currently being tested in actual operations, is a special hydraulic boom winch designed to permit gillnetters to discharge without the slow and man-tiring task of pitching fish from boat to scow. The two men on the gillnet boat get their fish into a basket, and the boom does the rest. They get back to fishing quicker, and without being "bushed" by the hard work of pitching salmon high. There is a potential saving in both fish and fish quality.

Because of the need for conserving deck space on power scows and small commercial vessels of all kinds, a power winch was designed for boom-mounting, and hydraulic drive was selected because of the ease and low cost of installation, flexibility of control, and safety features.

The hoist uses hydraulic pumps and motors, and is controlled through a single hydraulic valve. Raising the handle lifts the load; depressing the lever lowers it; degree of movement of the valve regulates the speed; neutral is braking position, and when the handle is on neutral the load remains safely suspended.

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SHELLFISHING IN BRITAIN

HYDRAULIC BOOM WINCH

2.117 LARGE NON-FACTORY TRAWLER

Anonymous
Fishing Gazette (Annual Review Number) 73, No. 13, 59 (1955-56)

One of the biggest non-factory type trawlers in the world was put into service early in 1956 by French owners out of Bordeaux, France. It is the 241-foot b. p. Zelande, which is to be used in the salt-cod trade. The Zelande is expected to make either two trips a year of 150 days each, or three trips of 100 days. Descriptive data on the vessel include the following:

Length b. p. approximately 241 feet
Breadth " 40 feet 7 inches
Normal load capacity 1,880 tons
Corresponding draught 16 feet 10 inches

The Zelande was entirely prefabricated and was on the stocks at the builders for no longer than 6 months. She carries a crew of 60. Her main propulsion unit is a type 5,50 VF90 diesel unit that develops 1,750 h. p. at 200 r. p. m. Auxiliaries include three 240 h. p. diesels for the operation of generators and service pumps.

The trawl winch is operated by a 180 h. p. electric motor installed in the bulkhead immediately aft of the winch. Three generators are used to feed variable power to this motor.

Equipment includes a complete cod liver extraction system, radar, and an echo sounder.

The reason given by the owners for building a vessel of this size is that in the salt-cod fishery, bad weather becomes less of a disadvantage as the size of the vessel increases and they feel that it

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2.117 FIRST SEINER OF STEEL

Anonymous
Western Fisheries 54, 16-18 (September 1957)

A steel cod seiner is being watched speculatively by fishermen, company executives and boat-builders, for she may be the pacesetter for a new trend in West Coast fishing-vessel construction. The first all-steel fishing vessel of her size to be manufactured in a British Columbia yard, Pacific Ocean, was meant from the first conception to be a trend-maker.

Steel hulls have been built in B. C. before, and there are several part-steel boats operating in the fishery at the present time, but boats the size and complexity of Pacific Ocean have not been attempted.

Why steel? It boils down to a few simple arguments: (1) initial construction costs are slightly cheaper, (2) maintenance costs are considerably less than those of a wooden boat after the first four or five years, and (3) steel has much to offer fishermen who wish to use chilled sea-water tanks. The steel hull itself is used as tank walls, which gives much more volume to the tanks than would be possible with a wooden hull. Steel is also fireproof and watertight, and airtight compartments can be engineered much better in a steel hull.

A good coat of paint is the best protection for a steel hull; when this starts to chip and wear thin the hull must be sand-blasted. This usually occurs once in three years. Major expense will be incurred when a plate must be replaced, but this happens under normal conditions about once every 30 years.

Insurance costs for steel boats are about half those for wooden boats in some parts of the world, although it is difficult to assess this factor in B. C. Up to this time there have been no all-steel fishing vessels in B. C. fisheries, and insurance companies have not established a rate structure for them.

The new steel seiner will be used to "fish everything." It is expected that a large part of its

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ZELANDE

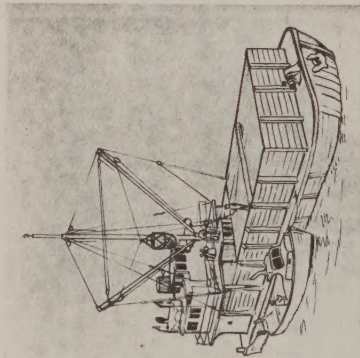
NEW STEEL SEINER

Safety features include: load is held in event of power failure; control lever goes into braking position automatically when released; and jerk in starting a heavy lift is prevented.

Hydraulic boom winches, such as those supplied for the power scows, are built in a range of direct line pull lift from 2,000 to 10,000 pounds, and with line speeds from 0 to 150 feet per minute.

For use in connection with the hoists on the scows, interesting brails were devised. These consist of a rope mesh bag, closed at the bottom with a Canadian brailling release. The upper half of the brail is supported by a welded steel frame, which permits it to receive a substantial quantity of fish while seated in the gillnet boat.

In practice, fish are tallied into the brail, which is then raised by power and lowered into the fish bin, and the salmon released easily and without damage.



Accompanying sketch shows how the hoists were installed to permit two gillnetters to discharge simultaneously, the fishermen loading their fish into brails and being relieved of the necessity of pitching their catch up onto the scow. Saves time, men and fish.

former are used on muddy bottom, into which a normal creel would sink, and are unsuitable for strong tides or ground swell. The collapsible pot is designed to take up less space in the boat when the gear is being moved to a new location or brought ashore under threat of severe weather. Despite the simplicity the collapsible pot has not achieved great popularity, possibly because its construction involves a great deal of metal work and welding. At Broadstairs, however, a fleet of these pots is used successfully. They are of iron, covered by net, and have an entry at either end on opposing sides. They are frequently dipped in tar.

It is also of interest at this point to mention the snatch net, hoop net, or scoop, which consists of an iron ring of about 36 inches in diameter. It is loosely covered by netting and attached by a bridle to a buoyed rope. It is hauled at short intervals, whenever a lobster or crab is found at the bait tied in the center of the net.

Lobsters are trawled when the ground is not too rough, and good catches have been made in this manner at certain times of the year.

Bait is a much discussed question among pot fishermen; choice is largely governed by cost and availability. For this reason, fish pieces and salted bait are being turned out in large quantities by generations. Recent research has shown, however, that fine mesh fish gives far better results than salt fish. Skate and plaice are the lobster bait. Greater latitude in choice of bait is given by the use of a "bait box," which can be in the form of a separate perforated container or as a recess in the pot, with a lid that is accessible from outside the pot. As fish are attracted by small rather than sight, it is possible that recent developments in artificial-bait paste may solve many problems in the future.

The problem of escape from pots has received some attention of late, as has also that of the mesh of the entry funnel net, where finer net in the floor of the funnel has improved catches. Such devices as white painted pot bases and shiny metal lures are also reported to give results.

Lobsters that escape after capture are usually small, but often of saleable size. This has been prevented by a "Y" shaped piece of wire, hung to act as a one-way door at the end of the funnel. Again, this is not widely used, possibly because of constructional difficulties.

It is said that crabs and lobsters will not attempt to escape until the bait is consumed, therefore the bait box may do much to retain the catch by the attraction of its contents.

income will come from halibut; it is also fished out to trawl, and will fish herring in the winter. She had her shakedown cruise in the hotly competitive Juan de Fuca fishery, where her best day's catch was 2500 pinks taken off Sooke.

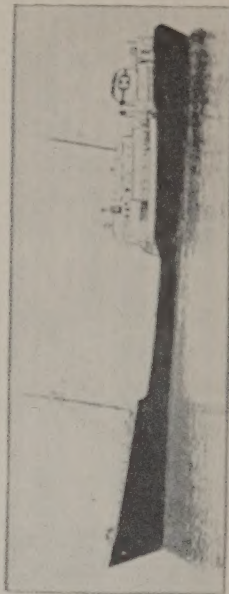
The giant drum, which equates on the stern of Pacific Ocean, makes her the largest drumseiner in B. C. waters, and one of the largest in the world. The big roller is 13 feet wide and 8 feet high. It carries 300 fathom of salmon seine net of 3 strips deep with room to spare. The drum is more punishing to net and floats than a table, and to ease danger of breaking the floats as they roll over the spool, the last 100 fathoms of net has the corks tied on a separate line, which is slack when it is rolled over the drum. All lines on the net are nylon. Pacific Ocean can make a complete set in one hour, compared to about 1½ hours with a conventional table seine with power block.

The most disturbing question to haunt owners of small steel boats is the old bugaboo about the dangers of electrolysis. Suggesting that this is just an old wives' tale, the designer said this is not a serious problem. Electrolysis on a steel boat is sometimes less than on a wooden one. To counteract electrolysis most steel boats merely have a zinc plate around the propeller, but to be extra safe, electrolytic zinc pads 18 inches in diameter have been installed in the engine room. The danger of electrolysis on this boat is said to be nil.

Pacific Ocean could be called a prefabric job. The keel was built first, and placed on the ways. Then the forward tanks and the stern sections were welded on. The deck was part of the prefabricated hull sections, so once the prefabric parts were made, the hull and deck were in the finished state. There are six watertight compartments. The boat will stay afloat and should still be maneuverable. If a hole is punched in one section, the boat will stay afloat at the greatest depth. Gross tons are 104.79, and the net tonnage figure is 71.39. Her freeboard at the deepest point is 8 feet, and when floating light she has about 30 inches of freeboard at the deepest point.

The Pacific Ocean will be able to carry more than 100 tons of halibut in chilled sea-water tanks. The water is chilled by two 5-ton units in four huge tanks, each of which has a mechanical door to release the fish into the main hold in the center of the ship. The tanks are insulated with foam glass applied with a trowel. Two large bait tanks are located under the drum. No water is carried in the tanks when the boat is fishing and packing herring, and the capacity of the hold is then 120 tons.

will be reasonably easy to handle a vessel of this size on the fishing grounds.



2.15 HOW PRACTICAL OPERATORS FIND PROFIT IN CONSERVING FRESH SALMON QUALITY

Anonymous
Pacific Fisherman 55, 27-28 (September 1957)

The use of refrigerated sea water for holding fish before processing has found wide acceptance in the Pacific Northwest and Alaska. Sea-water chilling units are operating on cannery docks, packers, tenders, seiners, and trollers from Oregon to Alaska.

Refrigerated scow.--The 84'-by 24-foot twin-screw power scow Dorotha was outfitted in 1955 as a combination sea-water-chilled and "dry" storage refrigerated tender. She can chill and hold 25,000 to 30,000 average-sized red salmon or 40,000 pink salmon at one time. Her five steel tanks are lined with refrigerating coils that chill sea water to 31° F. and also can pull down the temperature to 0° F. for dry storage of frozen fish. This is particularly useful for transporting frozen halibut from cold storage plants in Alaska to Seattle.

The capacity of the tanks on the Dorotha is approximately 4,000 cubic feet. Vertical steel elevators raise the fish from deck level to be distributed through portable chutes to the hatches of the tanks. Each tank has a watertight gate through which the fish can be sluiced when unloading.

The water in the tanks is kept at 31° F. during the run to the fishing grounds. As fish are taken, they quickly are brought down in temperature to just above freezing. The refrigeration machinery is housed in the engine space aft.

Commercial units.--A number of firms are manufacturing sea-water-chilling units for the use of (over)

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ABSTRACTER: Kathryn L. Osterhaug

2.2 TECHNICAL NOTE NO. 40--EXPERIMENTAL MOBILE DE-ICING, WASHING, AND WEIGHING UNIT FOR UNLOADING FISH FROM VESSELS

Slavin, Joseph W. (U.S. Fish and Wildlife Service, East Boston, Massachusetts)
Commercial Fisheries Review 19, 9-10 (August 1957)

A mobile fish de-icing, washing and weighing unit for unloading New England groundfish from the fishing vessel has been designed at the East Boston, Technological Laboratory of the U. S. Fish and Wildlife Service. After the design has been criticized for possible improvement, the unit will be constructed.

The proposed unit, see figure 1 (over), consists of a steel frame mounted on eight rubber-tired swivel casters. Attached to this frame are a wooden loading platform, a receiving hopper, a rotating cylindrical screen-type de-icer and washer, a conveyor, and a weighing hopper connected to an automatic moisture-proof scale.

De-icer and washer.--The combination de-icer and washer consists of a rotating screen, 8 feet in length and 3 feet in diameter, made of 3/16-inch diameter wire mesh with 1-3/4-inch square openings. The fish are washed by water flowing through a 1-1/2-inch diameter perforated pipe located in the upper half of the rotating cylinder. Power for rotating the cylindrical screen is provided by a 2 h. p. electric motor.

Conveyor.--The conveyor is a 3-foot wide galvanized metal belt with galvanized angle-iron flanges attached transversely at 2-foot intervals. It is designed to operate at a speed of 260 feet per minute.

Weighing hopper.--The galvanized metal weighing hopper has a calculated holding capacity of 2,300 pounds of fish. The hopper is suspended from an enclosed lever system. It has a manually operated gate in the bottom so that the operator can dump the fish out of the hopper and into a cart

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CHILLED-BRINE TANKS

FISH UNLOADING UNIT

2.43 PIGMENT CHANGES IN PACKAGED BEEF DURING STORAGE

Pirko, Paul C. and Ayres, John C. (Food Processing Laboratory, Iowa State College, Ames)
Food Technology 11, 461-468 (September 1957)

Fresh beef has a characteristic color on which the consumer relies as a criterion of quality. Purpose.--This study was made with the aid of reflectance spectrophotometry to measure the influence of different packaging materials on surface discoloration and pigment changes in packaged fresh beef.

Experimental.--Wave lengths characteristic for myoglobin, oxymyoglobin, and metmyoglobin were identified from minimal reflectance values. Pigment changes, after storage for 14 days in a refrigerated display case, were confined to the wave lengths characteristic for these three pigments.

Results.--At a wave length of 635 mμ, the packaging materials fell into three groups: Group 1 materials were 300 MSAT 80-cellophane, 0.005-inch polyethylene, and 80 FM 1-plofilm; they permitted the concentration of metmyoglobin to increase upon prolonged storage and reach a maximum on the sixth day. Group 2 materials were 120 HM 1-plofilm and 0.0020-inch polyethylene; they permitted maximum metmyoglobin formation to occur on the fourth day of storage. Group 3 materials were 0.0015-inch aluminum foil, FX 831, 450 K202-Saran coated cellophane, 50 gauge 517-Saran, evacuated cryovac, and evacuated and shrink Cryovac; they permitted maximum metmyoglobin formation to occur on the first day of storage. Reflectance values of group 1 materials reached a minimum of 8 to 14 percent by the sixth day and were considered as the least satisfactory of the materials tested. Reflectance values of group 2 materials reached 13 to 18 percent on the fourth day of storage. Reflectance values of group 3 materials were minimal. They reached 19 to 24 percent on the first day of storage and were not detectable thereafter. Group 3 materials permitted the least metmyoglobin formation.

Regeneration of the desired pigment formation in meats packaged in these materials was possible for as long as 14 days. In every instance, reformation of myoglobin was accompanied by a (over)

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ABSTRACTER: Martin Heerdt

3.12 ANTIBIOTICS

Anonymous
Chemistry and Industry No. 24, 753-754 (June 15, 1957)

The following paper was presented by Dr. Ella M. Barnes, University of Cambridge, at the 1957 Health Congress of the Royal Society of Chemical Industry in the Town Hall at Folkestone, England on April 30, 1957.

During the past year there had been a steady increase in the number of countries permitting the use of specified antibiotics as food preservatives, although at the present time none of these was allowed in Britain. In Canada, for example, chlorotetracycline was permitted in ice for fish, while both chlorotetracycline and oxytetracycline were allowed for uncooked poultry in the United States.

Antibiotics differed widely in their action. Suitable compounds could be used to retard either the general spoilage of raw products (meat, fish) or to retard specific types of spoilage in such commodities as canned goods, cheese or beer. Only the tetracyclines had so far given a reasonable extension of the storage life of the raw products. In the United States the maximum level permitted of the storage industry (the care part of the bird) was 7 p.p.m. and its use was by agreement restricted to plant which complied with a strict standard of hygiene. In Canada no more than 5 p.p.m. of chlorotetracycline was allowed in raw fish. Resistance to molds and yeasts was often the limiting factor in the use of tetracyclines. Experiments at Cambridge with minced meat treated with chlorotetracycline had demonstrated that spoilage was eventually due to the resistant yeasts present.

Anaerobic organisms in deep muscle tissue, if present, might multiply and cause putrefaction if the carcass was not cooled sufficiently rapidly after slaughter, and in the United States this effect

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Reprinted in whole

PIGMENT CHANGES IN BEEF

ANTIBIOTICS FOR FOODS

or box,

Scale. --The scale consists of an enclosed lever system located over the weighing hopper and connected to a direct-reading indicating dial. The cut off switch is connected to the control switches in such a manner that when the desired weight is reached, the operation of the conveyor and de-icer is stopped.

Plans for this unit may be obtained from the Fishery Technological Laboratory, 61 Sumner Street, East Boston, Massachusetts.

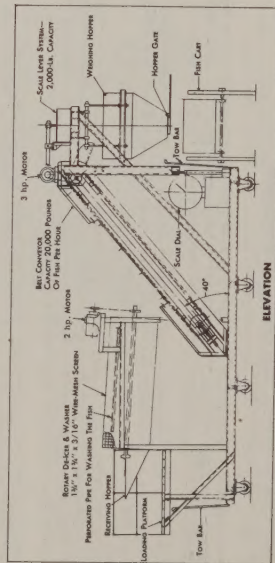


FIG. 1 - MOBILE FISH DE-ICING, WASHING, AND WEIGHING UNIT.

the fishing industry. One Seattle, Washington company has designed and developed five sea-water-resistant package units, which range in size from one that is capable of chilling 8,000 pounds of fish to 30° F., to the largest unit, which can chill up to 140,000 pounds of fish to 30° F. The smallest unit is designed for trollers and gillnetters, and the largest unit is intended for shore installation or for use on packers and tenders.

The refrigeration machinery for these installations employs heat exchangers mounted directly on the units. This method eliminates perimeter piping in the fish tanks. The sea water continuously circulates through the tanks and back to the heat exchanger for temperature reduction. Both electrically driven and gas-engine-driven models are available. The smaller units may be driven hydraulically as well as by auxiliary gas or electric motors.

Refrigerated sea-water installations with considerable variation are available from a number of other firms in the Northwest.

Some members of the refrigeration industry predict the use of chilled sea water for truck and rail transportation of fresh fish sometime in the future.

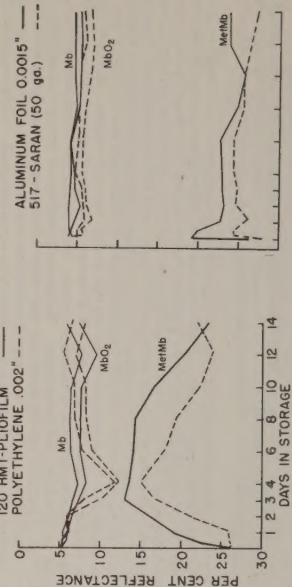
had been checked by a preslaughter injection to give an overall level of 2 p. p. m. of antibiotic in the meat. A similar spoilage problem existed for whales, and trials had shown that both chlor-tetracycline and oxytetracycline were effective.

Regarding the use of antibiotics to control one or more groups of microorganisms responsible for particular types of spoilage, Dr. B. W. Snow and his associates have been especially successful in developing a heat-stable antibiotic, active especially against spore-forming bacteria, which is added to fish and sublinin were being tested in this connection. Nisin could also be successfully incorporated in cheese to suppress *Clostridium botulinum*. Polymyxin was permitted in the United States to control an organism, *Flavobacterium*, which causes spoilage of fish. The use of antibiotics in the yeast culture for beer, and various substances were being suggested for the treatment of precooked frozen foods. The problems of resistant organisms and the use of antibiotics in the control of the main food poisoning organisms, were discussed in detail and Dr. B. W. Snow concluded by expressing the opinion that if regulations were made to permit the use of antibiotics and to restrict their use only to approved plant and under approved conditions, an improvement in the standard of hygiene of some factories might follow with the assurance that antibiotics were not being used to mask the insanitary handling of food.

2.43 (Cross Reference: 7.592)

decrease of metmyoglobin. The vacuum packaging of fresh meats did not increase the amount of discoloration that occurred with group 3 packaging materials.

Maximum values for metmyoglobin occurred at the same time that minimum oxymyoglobin and myoglobin values were obtained. Drying of packaged meat depended upon the thickness of the meat, and the loss of weight in these cuts was inversely proportional to their thickness. Excessive moisture loss caused the surface of the meat to harden and simultaneously increased all reflectance values. Spectral



Changes in percent reflectance¹ during storage of packaged beef at wavelengths characteristic for metmyoglobin (635 *mμ*), oxymyoglobin (580 *mμ*), and myoglobin (555 *mμ*).

3. 12 GENERAL PRINCIPLES GOVERNING THE USE OF FOOD ADDITIVES

Anonymous
Report of the Joint FAO/WHO Expert Committee on Food Additives, First Session, Rome, Italy,
December 3-10, 1956, 22 pp. (1957) (Rome)

1. The increase in the number of chemicals used or proposed for use in or on foods has imposed upon public health authorities and other governmental agencies the responsibility for deciding whether or not such substances should be employed. Food additives have a legitimate use in the food processing and distribution systems of both technologically advanced and of less well developed countries, in that they promote the better utilization of available foods.
2. The use of food additives to the advantage of the consumer may be technologically justified when it serves the following purposes: (a) the maintenance of the nutritional quality of a food; (b) the enhancement of keeping quality or stability with resulting reduction in food waste; (c) making foods attractive to the consumer in a manner which does not lead to deception; and (d) providing essential aids in food processing.
3. The use of food additives is not in the best interest of the consumer in the following situations and should not be permitted: (a) to disguise the use of faulty processing and handling techniques; (b) to deceive the consumer; (c) when the result is a substantial reduction of the nutritive value of the food; and (d) when the desired effect can be obtained by good manufacturing practices which are economically feasible.
4. Safety for use of an additive is an all-important consideration. While it is impossible to establish absolute proof of the non-toxicity of a specified use of an additive for all human beings under all conditions, critically designed animal tests of the physiological, pharmacological and biochemical behavior of a proposed additive can provide a reasonable basis for evaluating the safety of use of a food additive at a specified level of intake. Any decision to use an intentional additive must be based on food additive at a specified level of intake.

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Authors' summary

3. 19 PRODUCTION OF CARBONYL COMPOUNDS DURING IRRADIATION OF MEAT AND MEAT FATS

Batzer, O. F.; Stribney, M.; Doty, D. M.; and Schweigert, B. S. (American Meat Institute Foundation, and Department of Biochemistry, University of Chicago, Illinois)
Journal of Agricultural and Food Chemistry 5: 700-703 (September 1957)

Preliminary experiments have shown that an increased amount of carbonyl compounds was produced during irradiation of meat fat at 2×10^6 rads per gram. These changes also have been observed in model systems. Mead and Aspell (1952 and 1954) and Dugan (1954) reported an induction of autooxidation of methyl linoleate, and Dugan and Landis (1956) reported an increase in peroxides and carbonyl compounds from the irradiation of methyl oleate.

Meats with a high fat content develop off-odors during irradiation to a lesser extent than do lean meats. The possibility of carbonyls from fat being involved in the suppression of off-odors merited further investigation.

In this study, determinations were made of carbonyl compounds extracted with benzene from beef and pork fats as well as those extracted by astringent solutions and benzene from ground beef muscle irradiated under a variety of conditions and dosages.

Experimental. --Beef suet and pork fat, purchased at local markets, were ground in a food chopper, weighed, and packed in regenerated cellulose casing. Suet casing, or cork-stoppered glass vials, and held at 5°C . until irradiated.

Two cobalt-60 irradiation sources were used: one with a dose rate of approximately 350,000 rep

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ABSTRACTER: Kathryn L. Osterhaug

FAO REPORT ON FOOD ADDITIVES

EFFECTS OF IRRADIATION

3. 19 MACHINES GIVE CHEAPER RADIATION

Stockman, C. H. and Bauman, R. G. (B. F. Goodrich Co.)
Chemical and Engineering News 35, 16-21 (August 5, 1957)

Irradiation costs. --Doses of radiation are usually measured in megarads (million roentgen equivalent physical), whereas product throughput is measured in pounds. Cost per megarep pound thus becomes a convenient measure of irradiation. Estimates of cost for using a 10 kilowatt (kw.), 2 m. e.v., resonant transformer and a 2 kw., 3 m. e.v., Van de Graaff averaged, respectively, $\frac{1}{2}$ cent and 1 cent per megarep pound. Both costs are figured as functions of over-all irradiation efficiency.

Machines vs. isotopes. --About 67,000 curies of cobalt-60 or about 127,000 curies of cesium-137 are required to produce 1 kw. of radiation energy. On the basis of purchase price alone, cobalt-60 would have to sell for 18 cents a curie to compete with the 10 kw. resonant transformer or to sell for 62 cents a curie to compete with the 3 kw. Van de Graaff. These cost figures are below current prices, and the cobalt-60 price of 18 cents per curie may not be achieved even within the next 10 years.

Types and costs of irradiation machines. --The three principal kinds of electron accelerators on today's market are: (1) the resonant transformer, (2) the Van de Graaff, and (3) the linear accelerator. The resonant transformer currently is the least costly per kilowatt of beam power, whereas the linear accelerator is the most costly per kilowatt. At present the resonant transformer is limited to 2 m. e.v., the Van de Graaff to 5 m. e.v., and the linear accelerator to not less than 20 m. e.v. The Van de Graaff and the linear accelerator produce nearly monoenergetic beams. Use of these machines limits material of unit density to about 0.15 c. per m. e.v. for irradiation from

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COMMERCIAL FISHERIES ABSTRACTS VOL. XI, NO. 1 PAGE 7
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ABSTRACTER: Martin Heerd

3. 231 VIBRATION USED TO TENDER FROZEN MEAT

Anonymous
The National Provisioner 137, 21 (October 19, 1957)

A new process utilizing ultrasonic waves to tenderize meat and other foods has been announced. The new process is said to be widely applicable to the entire food processing field, with special meaning for meat, poultry, fish, fruits and vegetables. The known tendering processes indicate that the new process will add a new method to the list of known tendering processes. It is possible that work in field tendering progressed to a point where it is possible to foresee a time when meat packers will be able to supply consumers with meat of relatively uniform tenderness on a production line basis.

The new process is said to cause no taste or color change in the product. Food products are first frozen to a rigid state, guaranteeing retention of the original shape and natural juices. The frozen food is then immersed in a brine-filled tank and subjected to vibration through the use of a transducer that produces sound energy in the sonic or ultrasonic range. The transducer's mechanical vibration, which is necessary to break the fibers in the food, is brought about through the use of high frequency waves that may vary from 1,000 cycles per second to 1,000,000 cycles per second. The process may be momentary in duration or require an hour or more, according to the characteristics and size of the product being handled.

Dry ice, regular ice, or cooling coils may be employed in the brine solution to maintain the product in its frozen state while it is being treated. In the apparatus shown in figure 3, the tendering operation would take place in a freezer cabinet.

Figure 1 is a sectional view of a brine-filled tank containing a piece of frozen meat with the tendering vibration being carried through

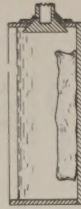


FIGURE 1

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ABSTRACTER: Kathryn L. Osterhaug

COST OF FOOD IRRADIATION

ULTRASONIC TENDERIZER

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per hour and refrigerated to 5, 5° ± 2° C.; the other with a dose rate of approximately 106 rep per hour, and with a temperature of about 20° to 22° C.

Results. --Preliminary studies on pork and beef fat irradiated at 2 x 10⁶ rep indicated that an increase occurred in the amount of carbonyl compounds over that present in the control samples. Spectra curves of the 2,4-dinitrophenylhydrazine derivatives from the irradiated fats were obtained. The curves of the 2,4-dinitrophenylhydrazine derivatives of various aliphatic aldehydes with the same number of carbons gave curves that were similar to those obtained for the fat samples. The derivative of n-heptaldehyde, the compound closest to that observed for the carbonyl compounds from the samples of fat. This compound determination selected for the preparation of the standard curve which was used for the subsequent determination of the carbonyl content of irradiated and nonirradiated fat. The solution obtained from fat followed Beer's law with increasing concentration of sample. While the limitations of this procedure are recognized, it was necessary to have some basis for comparison of the values obtained between irradiated samples and controls.

The values obtained from beef and pork fat when irradiated in the transparent casings indicate that an increase in carbonyl compounds occurred on irradiation.

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on the considered judgment of properly qualified scientists that the intake of the additive will be substantially below any level which could be harmful to consumers. Permitted additives should be subjected to continuing observation for possible deleterious effects under changing conditions of use. They should be reappraised whenever indicated by advance in knowledge. Special recognition in such reappraisal should be given to improvements in toxicological methodology.

Other factors must be taken into account in food additives control. When a new food additive is proposed, it must be available to show that benefits to the consumer will ensue. In classes of food, it must constitute a considerable proportion of the diet the use of intentional additives should, in principle, be limited. The presence of harmful impurities in food additives can be excluded most effectively by the establishment of specifications of purity. Food additives should be identifiable in chemical analysis.

6. The amount of an authorized additive placed in food could be the minimum necessary to produce the desired effect. The limit should be established with due attention to (a) the estimated level of consumption of the food or foods for which the additive is proposed; (b) minimal levels which in animal studies produce significant deviations from normal physiological behavior; and (c) an adequate margin of safety to reduce to a minimum any hazard to health in all groups of people.

7. Legal control over the use of food additives is essential. This is best accomplished through the use of a permitted list, which effectively prevents the addition of any new substances to food until an adequate basis for judgment of their freedom from health hazard has been established. The alternative method of a prohibited list involves risk, since it may result in the use of a harmful additive before it has been adequately studied.

8. In principle, consumers should be informed of the presence of additives in their food. Label declaration is the most effective method of achieving this result. A simple declaration of the presence of a particular class of additive is sufficient.

9. Regulations governing the control of food additives are useless unless the law can be enforced. This requires trained food inspectors, food control laboratories, and reliable analytical methods.

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the brine from the transducer at right. Figure 2 is a sectional view of a multiple applicator for applying high frequency vibrations to a number of areas on a frozen food. Figure 3 is a side view of a continuous tenderizing device with a number of transducers on a drum and the food being moved by a continuous belt.

The devices shown here are operated by magnetostriction and by piezo-electric crystals. It is pointed out that many other types of transducers can be used, such as electro-magnetic devices, air pressure resonators, or capacitor motors, as long as sufficient power can be transmitted at the frequency of the applied electrical wave.

The fact that this procedure will transform tough and fibrous meats, fish, poultry and produce into succulent and digestible foods is said to imply economic reorientation in the food industry.



FIGURE 2

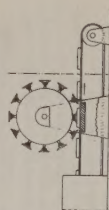


FIGURE 3

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one side only or 0.5 cm. per m. e. v. for irradiation from both sides. Conversely, uniformity of dose in the sample is greater with the resonant transformer, and maximum intensity is only about 25 percent greater than the surface intensity. With the Van de Graaff, maximum intensity may be as much as 70 percent greater than surface intensity.

What Electron Accelerators Cost Today

Type	Manufacturer	Beam Energy (m.e.v.)	Beam Current (ma.)	Beam Power (kw.)	Approximate Price
Resonant Transformer	General Electric	1	6	5	\$ 69,000
Resonant Transformer	General Electric	2	6	10	120,000
Van de Graaff	High Voltage Engineering	1	0.25	0.25	39,000
Van de Graaff	High Voltage Engineering	2	0.25	0.50	70,000
Van de Graaff	High Voltage Engineering	3	1	3	126,000
Linear Accelerator	Varian Associates (Army Ionizing Radiation Center Contract)	24		18	625,000
Linear Accelerator	Applied Radiation	10	0.7	4	145,000

3, 236 NEW FLASH-FREEZING TUNNEL INSTALLED AT ST. SIMONS ISLAND, GEORGIA PLANT	Anonymous Fishing Gazette <u>74</u>, 35, 88 (August 1957) A new flash-freezing tunnel installed in a Georgia seafood plant has a freezing capacity of 3,000 pounds an hour. To flash-freeze shrimp at -50° F., the tunnel is refrigerated with a two-stage refrigeration system composed of a 18- by 10-inch ammonia compressor, which is used as a booster, and a 9- by 9-inch upright FAC for the second stage. The cooling capacity of the two compressors is acting in tandem is 52 tons. The design allows for the future addition of other compressors if that should become desirable. Three blowers are used to circulate the air through the refrigerator coils, across the roof of the tunnel, and back through adjustable louvers across the tunnel. After the raw shrimp have been washed, graded, peeled, and deveined, they are individually plinned by the tail on special steel racks. They then are immersed in batter up to the tail joint, and coated with breading. The shrimp-filled racks are loaded on freezer carts and are taken to the freezer tunnel by way of an ante room that is maintained at about 0° F. The tunnel doors open automatically, and the product-laden carts are taken through the tunnel by a hydraulic pusher. The shrimp usually are left in the tunnel for about 13 minutes and then released into a second ante room. After coming out of the tunnel, the shrimp are depinned and placed on a packing conveyor, a 30-inch wide rubber belt, which carries the shrimp past a group of workers. The workers count shrimp of uniform size into cartons, and the count per package is marked on the container at the end of the line. COMMERCIAL FISHERIES ABSTRACTS VOL. XI, NO. 1 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug
3, 25 SPECIALIZED REFRIGERATION EQUIPMENT MEETS TRUCK DEMANDS	Kirkpatrick, H. O. Refrigerating Engineering <u>85</u>, 88-89, 80, 82, 84-85 (September 1957) Introduction. -- The most common truck-trailer refrigeration unit is powered directly by an internal combustion engine that burns butane, propane, or gasoline. One manufacturer builds this type of unit in a self-contained, one-piece package that can be installed through a prepared opening in the front trailer wall so that the evaporator section projects into the refrigerated space and the condenser section remains attached outside. This type of unit has an engine that starts and stops automatically in response to a temperature control unit. Electric plug-in motors are available as an optional accessory on all types of units. Heretofore, in recent years, at least two manufacturers have introduced a refrigeration system that is powered by an internal combustion engine-alternator power unit. One of these systems uses a self-contained hermetically sealed refrigeration unit that mounts through an opening in the upper front wall of the trailer and is combined with an engine-alternator unit that mounts beneath the trailer floor. Also available are refrigeration units, unsuited for common carrier that are driven only when the truck is rolling by a live axle, either directly or through an electric or hydraulic system. Mechanical refrigeration systems for local delivery trucks can be divided into those that (1) utilize the truck engine as the source of power to drive the unit and (2) those that utilize an auxiliary gasoline engine to drive the unit. The types of drives that employ truck engine power can be classified as direct, electric, and hydraulic. Direct drive. -- Units in the direct drive group are of two principle types. One type has a compressor mounted under the hood and is driven by a V-belt from the crankshaft like an automobile air-conditioning system. This is the simplest and most economical of all truck refrigeration drives. For stand-by or dockside refrigeration, this type of unit is modified to include a hermetically sealed motor compressor mounted in a unit package and connected into auxiliary circuits of the condenser and (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XI, NO. 1 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt

3, 333 NEW PARAMOUNT PLANT: SPEED, EFFICIENCY AND GLITTER	Anonymous Western Fisheries <u>54</u>, 12-16, 47 (August 1957) On the Fraser at Steveston is a fish cannery that represents a big step into automation. The new queenest-roofed plant has six lines with a capacity of 1250 cans a minute. It is completely powered by electricity and hydraulics, and can hold fish in good condition in times of heavy landings for as long as two weeks. The iron chink is twice as fast as the old models. It is the only plant in the province in which the fish follow strictly a straight line, from the time they are unloaded until they are stacked in cases. The slope and waste are carried out of the plant in flumes built into the floor, and are later sent to the reduction plant. The cannery was planned from the inside out. The best possible sequence of operations from boat to box was laid out, and then a plant was built around it. The fish begin at one end and are carried in a straight line to the other end, with no delay or detour. The cannery proper has a floor area of 24,000 square feet, and measures 300 feet by 80 feet. The box-up section is 120 feet by 80 feet, and the can loft on the upper floor brings the total square area of this part of the plant to 19,200 square feet. There is 20,000 square feet of warehouse space. Walls of the buildings are of concrete blocks. The roof is of corrugated aluminum sheeting braced by glue-laminated trusses, which allow an 80-foot roof span without a single post. Inserted into the roof are large panels of translucent fibreglass, which enable the plant to operate on a bright day without the aid of indoor lighting. Conveyor belts are not used to unload fish from the packers. The load is brailled into one of four sorters on the wharf, a method that is said to be easier and faster. A winch man dumps the brail in the sorter, a tally man sorts the fish, and a weigh man handles the scales, which are at the (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XI, NO. 1 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug
3, 335 JELLIED EELS FOR BOTTLING	Anonymous Food Manufacture <u>32</u>, 447 (September 1, 1957) The following method is suggested as a trial basis of preparing jellied eels. Cooking method. -- Skin the eels, remove their heads and tails, and wash them in salt water. Cut the prepared eels into 2-inch pieces and place in a kettle with salt, pepper, parsley, sage, a shallot, a wine glassful of white wine, 1/2 wine glassful of vinegar, and a small quantity of water. The wine may be omitted if desired. Cover the kettle with a lid and cook the eels gently until they are tender, then remove from the heat and allow to cool. Jelly for eels. -- The jelly used for packing jellied eels may consist either of a solution of gelatine or of agar. The best results will be obtained if the jelly is made by cooking together the bones, fins, and heads of white fish, salt, mace, pepper, bouquet garni, and 1 percent sugar or 5- to 10-percent gelatine. The jelly making process consists of simmering the bones, heads, fins, and seasonings in a covered kettle until all of the flavor and gelatine is extracted, after which the jelly liquor is skimmed and strained through muslin. Packing procedure. -- Pack the pieces of cooked eel around the sides of a mold with the ends turned towards the center, cover the packed eels with hot jelly, and place them where they will cool. COMMERCIAL FISHERIES ABSTRACTS VOL. XI, NO. 1 PAGE 9 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt

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evaporator coil assemblies. When operated on plug-in, the direct-current fan motors are powered through a transformer rectifier that lowers the alternating current voltage and converts it into a direct current.

The other type of unit in the direct drive group utilizes a flexible shaft that transmits power from the engine crankshaft pulley to a condensing unit mounted beneath the floor of the truck body. In this type, the condensing unit houses the compressor, condenser, receiver, a stand-by electric motor, and a 12-volt direct-current generator that powers the condenser and evaporator fan motors.

Electric drive.--Electric drive units also are of two types. One type uses an alternating current--direct-current system that consists of an alternator belted to the engine crankshaft, a rectifier, a voltage regulator, and series-wound compressor and fan motors. The alternator generates three-phase alternating current that is rectified to 80-volt direct current, and this current is maintained at constant voltage by the voltage regulator regardless of the alternator speed. For stand-by or do-nothing use, this system is wired so that two cells of the three-phase rectifier are utilized to convert 115-volt alternating current into 90-volt direct current.

The second type of electric drive unit uses a straight alternating current system with an alternator belted to the crankshaft. The alternator speed is maintained at 900 to 2700 revolutions per minute (r.p.m.). Regardless of the truck engine speed, by means of a centrifugally operated variable-pitch pulley system, the alternator output is applied directly without rectification to an alternating current motor. On plug-in operation, the capacitor and relay are placed in the circuit so the motor will operate on standard 230-volt, single-phase power.

Hydraulic drive.--Hydraulic drive is the latest and most popular entry in the field of refrigerated units. This drive uses a variable displacement, 8-cylinder, hydraulic pump belted to the truck engine crankshaft. At speeds of 450 to 3000 r.p.m., it will deliver a constant flow of hydraulic oil to a piston-type hydraulic motor. The hydraulic motor is belted to the compressor and fans, which it drives at an almost constant speed regardless of the truck engine speed. An oil reservoir and flexible hydraulic lines complete the hydraulic drive installation.

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end of the sorting machine. Fish from the sorter are released through hydraulic doors.

The fish are carried from the sorter on aluminum conveyors under the wharf, passing into one of ten huge steel tanks. During the week when the plant is operating, there is no water in the tanks--they are used to hold fish over week ends.

Three iron chinks feed the six canning lines. All conveyors and elevators in the plant are made of aluminum. The cutting tables are of stainless steel. There are 850 feet of raw-fish conveyors up to the filling machines, 200 feet of elevators, and 200 feet of empty- and full-can conveyors, cable driven. All conveyor pulleys are rubber-coated.

Each canning line has a variable-speed drive, which enables the operators to control the speed of the line from very slow to peak machine speed of about 275 cans a minute.

With a capacity of 12 cars, the five retorts are more than adequate to handle the production of the six lines operating at full speed. A new feature of the retorts is a quick-cooling system. After the 80-minute cooking process, the steam pressure is allowed to drop, and cool water is fed into the retorts through the steam pipes. The retorts are flooded for about 10 minutes, and then the cans are passed out, ready to be labelled and boxed immediately.

One of the most fascinating features of the new plant is the can-handling system. As the filled cans come off the line, they are scooped onto a large platform by a man using a steel L-shaped tool. When the platform is full, the man pulls a lever and a hydraulic lift lowers the platform slightly to allow another to be placed on top. With this method, one man can handle the loading of one line, which means that 250 cans a minute can be loaded by one man.

Lighting for the entire plant is color-corrected fluorescent tubing which allows no color distortion, a necessary factor when human judgment is so important in sorting salmon.

Heston, E. K.; Kayan, C. F.; and Woodroof, J. G.
Refrigerating Engineering 65, 42-47, 54-59 (August 1957)

Purpose.--Information is needed to improve handling practices for canned foods in fiber cartons. Specifically, information is needed about the relationship between moisture condensation on cartoned goods and (1) the relative humidity in the carton, (2) the manner in which the food was assembled and sealed in the carton, (3) the storage conditions, and (4) the humidity and movement of air during warm-up.

Experimental.--Cartons were assembled and filled with canned foods in a room at 70° F. and 45 percent relative humidity (R. H.), stored for one week in a room (a) at 30° F. and 50 percent R. H., or (b) at 30° F. and 75 percent R. H., and then warmed in a room (c) at 70° F. and 45 percent R. H., (d) at 70° F. and 90 percent R. H., or (e) at 85° F. and 65 percent R. H.

Experimental data.--The R. H. within a case of canned goods removed rapidly from a refrigerated room rose rapidly within 10 to 30 minutes, reached a maximum and dropped for about 30 minutes, stayed on a plateau for about 20 minutes, and then rose gradually for about 2 hours. With a R. H. of 90 percent or above, condensation occurred on the cans. R. H. was measured at a point about one inch from the nearest can. Condensation disappeared from the surface of the cans by running off, by puddling beneath the cans, by absorption by the container, and by evaporation. A close correlation was found between temperature-relative humidity gradients and the condensation of moisture on tin cans, glass jars, and boxed candies.

The amount of condensation that collected on canned products of widely different densities, when they were removed from storage at 32° to 70° F. and 90 percent R. H. was in proportion to the density of the product in the cans. In another experiment, condensation was influenced by the density of each package as a unit and not by the density of an individual component within the package. Condensation

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ABSTRACTER: Martin Heerdt

3. 5 SALTED AND DRIED FISH 3. SALTING AND DRYING OF MAASBANKERS

Rowan, A. N.

Fishing Industry Research Institute, Cape Town, South Africa, Ninth Annual Report, pp. 12 (1955-1956)

Heading and gutting.--Various methods of dressing maasbankers, prior to brining, were compared with regard to speed of preparation and to yield. The rates of preparation obtained by the different methods are relative rather than absolute because the only available workman was inexperienced at this job. Fish were headed and gutted: (1) by cutting across the neck, slitting open the belly cavity, and removing the gut; (2) by making a straight cut just behind the pectoral fin, slitting the portion of the fish; (3) by cutting vertically at the vent and discarding the anterior portion of the fish; (4) by cutting slantwise above the pectoral fin to the vent and removing the gut; and (5) by heading and gutting the fish with a knife. The latter method was selected for use because it could not be removed. Method 5 fish were cut short to minimize the gut cavity, otherwise the gut could not be sucked out completely. The tails of method 5 fish interfered with the action of the tail plate, therefore these fish were held against the vacuum head.

The yield by weight from the fish in the round prepared by methods 1 to 5 was respectively, 70, 60, 38, 57, and 55 percent. The number of fish processed per minute per worker by methods 1 to 5 was respectively, 1.0, 1.2, 2.8, 2.3, and 5.0. The relative amount of headed and gutted fish that could be produced per man-hour by methods 1 to 5 or "yield x rate" was respectively, 70, 72, 106, 131, and 255. This indicates that the same amount of labor could produce about 3½ times as much prepared fish by machine cutting as it could produce by hand heading and gutting.

Brining and drying.--The economics of salted and dried maasbankers is based upon the yield per

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ABSTRACTER: Martin Heerdt

CONDENSATION ON CANNED FOOD

SALTING MAASBANKERS

Rowan, M. K. and Dichmont, A. D.
Fishing Industry Research Institute, Cape Town, South Africa, Ninth Annual Report, pp. 12-13 (1955-1956)

Experiments with the drop plate method for enumerating red halophiles were continued during 1955 and 1956 to test the reproducibility of the method and to test possible sample errors as they apply to South African solar salts.

Experimental.--Fourteen 10-gram samples of salt were drawn from a single 10-pound lot of infected solar salt. Each sample was dissolved, serially diluted, prepared, and poured as duplicate or triplicate plates at each of several dilutions. Dilution errors usually were large, and the incubation period needed to reach maximum counts varied from 18 to 30 days between duplicate plates.

Results.--The results of the tests on different samples of salt showed variation on an even larger scale than was anticipated. At a dilution of 1:100 the incubation periods required to reach maximum counts varied from 18 to 42 days; and the maximum counts ranged from 1,800 red halophiles per gram to over 300,000 per gram. Similar variations occurred at dilutions of 1:250 and 1:500.

As a result of these findings, further tests were carried out in duplicate with two samples of salt from other sources and in triplicate with the original sample. Special care was exercised to minimize sample and dilution errors, and the original sample was thoroughly mixed in a Waring Blender before the lots were weighed out. A single pipette calibrated to deliver 0.2 ml., was used

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3. 63 DRYING METHODS AND EQUIPMENT - IN AIR

Anonymous

Food Trade Review 26, p. 3 (June 1956) (London, England)
World Fisheries Abstracts 8, 35-36 (May-June 1957)

(a) During 1944 and 1945, a pilot plant for the dehydration of fish in Aberdeen, Scotland, was operated by the British Ministry of Food. The total area covered by the plant was 5,180 sq. ft. (481 m²). Two batches were processed daily, the input being nearly 5 tons and the output about 0.75 tons. Freshly caught herrings were washed and filleted by machines before processing or, if not processed immediately, were washed and scaled before storage in ice for not more than 2 days. In some cases, dehydrated kippers were produced by interposing a smoking process after filleting. The fillets, not previously brined or dyed, were given a mild cure during which they lost about 12 to 15% of initial wet weight by evaporation of moisture. Measured quantities of about 25 lb. (11.3 kg.) of fillets were loaded on perforated sheet metal cooking trays at a density of about 4 lb./sq. ft. (20 kg./m²). The trays were supported about 2½ in. (6.35 cm.) apart on trolleys, 11 trays to a trolley. The fillets were cooked in retorts for 20 min. at 6 lb./sq. in. (0.42 kg./cm²) steam pressure after 10 min. venting of air from the retorts for uniform cooking. Cooking liquors were allowed to run to waste. Immediately after cooking, the fish were cooled by a forced draft of air at about 7 to 8 ft./sec. (2.1 to 2.4 m./sec.) for about 30 min. to a temperature not exceeding 113° F. (45° C.). It was then minced and transferred to wire mesh drying trays where it was loaded normally at a density of about 2½ lb./sq. ft. (11 kg./m²). Four trucks, each carrying 44 trays, were inserted into a recirculating air drier based on a controlled smoking kiln (Torry kiln). The total load of wet cooked fish per batch was about 1.04 tons. The fish were dried to 4.5% moisture content (fat-free basis). To minimize the effects of bacterial activity and oxidative rancidity, the time interval between mincing and drying was kept within 2 hrs. During the first hr. of drying, the temperature

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ABSTRACTER: A. C. Jason

HALOPHILIC BACTERIA COUNTS

DEHYDRATION OF FISH

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tion of the original round weight of the maasbankers. To obtain this information, maasbankers weighing about 1 pound each were headed and gutted by method 1 above, slit in half, and the backbone removed. These maasbankers were then brined with number one coarse salt sprinkled below, between, and above the layers of fish at the rate of 1 pound of salt for every 3 pounds of fish. The salted fish then were covered with a saturated brine. After the fish had been in the salt and brine for 5 days, they were removed from the brine, drained, and dried for 48 hours at 80° F. The resulting dried product was dark brown in color and extremely tough even after it has been soaked in water for 16 hours. The following yields (percentage of original round weight) were obtained: after heading and gutting, 71.3 percent; after removing fins and backbone, 56.6 percent; after 5 days brining, 52.6 percent; after two days drying to 14.2 percent moisture and 21.4 percent salt, 31.6 percent; after recalculating the dried maasbanker to 25 percent moisture, 36.1 percent; and after recalculating the dried maasbanker with backbones and fins to 25 percent moisture, 43.9 percent yield.

A similar study was carried out during the manufacture of "Bokkems." In this case the fish were slit open, the gut and gills were removed, and the head was left in place. After 5 days in salt and brine as above, the fish were dried for 2 days at 80° F. to a moisture content of 25 percent. The following yields (percentage of original round weight) were obtained: after removing gills and guts, 86.9 percent; after 5 days in salt and brine, 81.2 percent; and after $\frac{3}{4}$ days of drying to 25 percent moisture and 14.5 percent salt, 62.0 percent yield.

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on boxes of candy, for example, was influenced by the density of the box as a unit rather than by the density of the individual pieces of candy. Extraneous packaging materials such as labels, paper cuts, cardboard partitions, and dividers within regular slotted containers greatly influenced the R. H. and condensation of moisture.

The time of packing cans in the cartons also influenced the R. H. and the formation of moisture particles in the absence of cans that were stacked four high. The R. H. in the center of a carton of canned goods and fell much more gradually when cans were stacked four high than when they were packed in a single layer. Specifically, R. H. rose gradually to 90 percent within an hour and remained high for more than 4 hours during which time condensation continued at a rapid rate.

A moisture barrier of aluminum foil or polyethylene sheets inside regular slotted containers protected canned products from condensation, and the R. H. inside of these cartons did not exceed 70 percent. Accordingly, cartons of goods normally do not contain enough water vapor to cause damage by condensation when they are removed from 32° F. to 70° F. and 90 percent R. H. The moisture barrier inside regular slotted containers also resulted in the accumulation of condensate on the outer surface of the barrier. This moisture was absorbed by the cartons and caused carton "fatigue" and partial separation of the layers of board. Moisture condensation did not occur on cans of goods that had been sealed in large glass jars at 70° F. and 55 percent R. H., cooled to 32° F., and then removed to 70° F. and 90 percent R. H.

Results also showed that the rate of condensation on packaged goods removed from cold storage to 70° F. was dependent upon the velocity of the air. At an air velocity of 256 cubic feet per minute, condensate formed on the surface of tin cans and evaporated in 115 minutes. If the air velocity was increased to 829 cubic feet per minute, the condensate formed and evaporated in 38 minutes.

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of the kiln was 180° F. (82° C.) and the fresh air ventilation was adjusted so that the wet bulb temperature at the outlet was 122° F. (50° C.) corresponding to a relative humidity of 20%. The fish temperature was initially just above the wet bulb temperature. As the fish dried, its temperature rose and after the 1st hr. wet bulb control was relaxed. During the 2nd hr., the dry bulb temperature was controlled at 170° F. (77° C.), during the 3rd hr., 165° F. (74° C.), and the 4th hr. and any subsequent period, 160° F. (71° C.). During the last 3 hrs. or so the wet bulb temperature usually fell steadily from about 115° F. to 91° F. (46° to 33° C.) corresponding to a fall in relative humidity from 26% to about 5%. About half-way through the drying period, the trolleys were turned about and their order in the drier reversed. When the fat content was about 14%, raw, minced cooked herrings required about 6 hrs. for complete drying. Minced, cooked kippers, already partly dried, took only about 4 hrs. to dry under the same conditions. A maximum of 10% water in the product was specified. Quantities of 3 or 4 lb. (1.4 to 1.8 kg.) of dehydrated herrings were gas-packed in N. in cans $\frac{7}{8}$ in. or $9\frac{1}{2}$ in. (18.4 or 24.1 cm.) tall and 6-3/16 in. (15.7 cm.) diam. Cod or codling were also dehydrated in the same plant using a similar procedure. The reduction of weight during cooking and subsequent cooling amounted to about 40%. After mincing, the fish were dried on trays in air moving at about 15 ft./sec. (5 m./sec.), maintaining for the first 2 hrs. a temperature of 185° F. (85° C.) and a relative humidity of 25 to 30% and reducing the dry bulb temperature by steps to 158° F. (70° C.) during the last $\frac{3}{4}$ hr. of a total of 4 hrs. drying time. Owing to its inherent hardness and brittleness only 3 lb. of dehydrated cod could be packed into the $9\frac{1}{2}$ in. (21.4 cm.) tall cans without excessive crumbling of the particles.

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throughout these tests. Plates prepared from the original sample required from 34 to 42 days to reach maximum counts and supported between 21,000 and 117,000 colonies at a dilution of 1:100. Duplicate counts on the other two samples ranged from 47,000 to 92,000 in one instance and from 108,000 to 236,000 in the other.

Conclusions.--These large variations may result from several factors such as extreme clumping of the organisms, highly heterogeneous distribution in the salt. The drop plate method, as published, appears to be of little value for the routine enumeration of red halophilus in South African salts because of poor reproducibility and wide variation in the incubation periods required to reach maximum counts.

3. 9 FISHERIES PRODUCTS FOR TROPICAL CONSUMPTION

Cutting, C. I., (Himber Laboratory, D.S.I.R., Hull, England) and Bakken, Kaare (Fisheries Research Institute, Bergen, Norway)
FAO Fisheries 10, 113-128 (July-September 1957)

One of the recommendations of the Food and Agriculture Organization at its meeting on herring technology held in Bergen, Norway in 1950 was that a study be undertaken of the possibilities for developing new and improved fishery products that might find acceptance by the protein-needy populations in Africa and Asia. The subject was assigned to a working group under the chairmanship of the senior author of this report.

The first step taken by the working group was to conduct a survey of the food habits of native populations in tropical countries and territories to learn something of their taste in fish products and how their needs are met by domestic production and imports, and at what prices. Information of this type was collected from the following territories: (1) East Africa (Tanganyika, Kenya, Uganda, and Zanzibar), (2) Southeast Africa and Rhodesia (Mozambique, Nyasaland, Northern and Southern Rhodesia), (3) French Equatorial Africa and the Belgian Congo, (4) West Africa (Ghana, British and French Territories), (5) India, (6) Pakistan, (7) Burma, (8) Malaya and Singapore, (9) Indonesia, (10) Thailand, (11) Cambodia and Viet-Nam, (12) The Philippines, (13) Borneo, and (14) New Guinea.

Possible products.—In tropical countries drying and smoking are common methods of fish preservation. The combination of salting and drying also is carried on to a limited extent. Refined fishery products are extensively used in the Far East. Their manufacture seems to be limited to the shores of Japan and South China Sea. The resulting products are highly flavored fish sauces that vary greatly in nutritive value.

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ABSTRACTER: Kathryn L. Osterhaug

4. 11 PAPER CHROMATOGRAPHY OF LIPIDES

Schlenk, H.; Gellerman, Joanne L.; Tillotson, Jerry A.; and Mangold, H. K. (University of Minnesota, The Hormel Institute, Austin)
The Journal of the American Oil Chemists' Society 34, 377-386 (August 1957)

Procedures for carrying out both qualitative and quantitative paper chromatographic analyses of lipids are described, including the applicability of various indicators and some special techniques, are described in this paper.

General procedures
 Preparation of the paper. — Strips of Whatman no. 1 paper for chromatographic purposes are dried and impregnated with silicone (Dow-Corning fluid 200).
 Solvent system for mono-chain liquids. — Aceto. acid water (85/15) is generally the best system, but a 75/25 mixture is more effective for resolving the more unsaturated components. Other solvent systems also are discussed.
 Temperature. — Thirty 2° C. is satisfactory for routine qualitative work, but strict temperature control is required in quantitative work.

Regulating the migration. — The R_f values may be lowered by decreasing the temperature or increasing the concentration of the more polar constituent of the solvent. The opposite measures effect a raising of the R_f values.

The sample. — The sample is usually applied to the paper as a 1-percent solution in ether, methanol, acetone, or acetic acid. Necessary concentration variation is discussed.
 Developing. — The chromatograms are developed using the ascending technique for 17 hours in closed jars.

Staining. — Techniques for the use of and color changes of iodine, iodine + α -cyclodextrin, α -cynhydrin, thionine, and ferrous sulfate + ammonium thiocyanate (detection of peroxides) are discussed.

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ABSTRACTER: Philip A. Hart

FISH CONSUMPTION IN TROPICS

CHROMATOGRAPHY OF LIPIDS

4. 21

REPORT OF THE FAT STABILITY SUBCOMMITTEE OF THE FAT ANALYSIS COMMITTEE--1956 ACTIVE OXYGEN METHOD FOR DETERMINING FAT STABILITY

Newby, Wales (Committee chairman)
Journal of the American Oil Chemists' Society 34, 394-398 (August 1957)

Introduction.—The Active Oxygen Method (A.O.M.) for determining fat stability is widely used in industry both in the United States and in other countries. The A.O.M. method, however, has not been accepted as an official method. For this reason, a committee was appointed in 1953 to evaluate all related methods and to revise the official method if necessary. At the November, 1954, meeting of the American Oil Chemists' Society in Minneapolis, this committee summarized its findings, agreed to discontinue collaborative work, and recommended the composite method, as outlined by the committee, to the Society for adoption as the official method.

Proposed official method.—By definition, the method measures the time (in hours) required for a sample of fat or oil to attain a predetermined peroxide value under the specific conditions of the test. Supposedly, the time required is an index of the resistance of a fat to rancidity, but exact relationships have not been established. The method can be (1) applied to all normal fats and oils of animal and vegetable origin intended for human consumption except fatty acids and (2) used for comparing other fats. In the latter use, an accurate evaluation would require establishment of endpoints that are not as yet available.

Precautions.—Since the procedure is highly empirical, close attention to details is essential. The most likely sources of error are inadequate cleanliness and inefficient temperature control. Acid cleaning agents cannot be used. Distilled water must be checked against the presence of

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ABSTRACTER: Claude E. Thurston

4. 21 SEPARATION OF THE OXIDATION PRODUCTS OF FATTY ACIDS BY MEANS OF GAS-LIQUID PARTITION CHROMATOGRAPHY

Nowakowska, Janina, Melvin, E. H.; and Wiebe, Richard (Northern Utilization Research and Development Division, Peoria, Illinois)
The Journal of the American Oil Chemists' Society 34, 411-414 (August 1957)

A preliminary study has been made of the oxidation products of soybean-oil fatty acids by the use of gas-liquid partition chromatography.

A 6-foot 3-inch stainless steel column of 8 mm. internal diameter was packed with Celte impregnated with D.C. silicon high vacuum grease in a ratio of 10:1 by weight. The column was maintained at $\pm 1^\circ\text{C}$. by an electrically heated air bath. A calibrated micrometer pipette and hypodermic syringe served to introduce the sample into the column through a rubber serum cap. The sample constituents were eluted with helium and the gas-vapor mixture was passed through a Gon-Mac TR-II detector for analysis. The detector was maintained at 197°C . during all determinations. The column temperature could be varied from room temperature to 250°C .

Figure 1 illustrates optimum conditions for the separation of a mixture of esters of mono-carboxylic fatty acids. The mixture contained nearly equal volumes of esters, from the caprate to the stearate, having an even number of carbon atoms.

Figure 2 represents a chromatogram of dicarboxylic esters from pimelate to sebacate

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ABSTRACTER: Donald C. Malins

DETERMINING FAT STABILITY

GAS-LIQUID CHROMATOGRAPHY

Identification of spots. -- The desirability of comparative chromatography of unknown substances with authentic specimens is discussed as an efficient method for the identification of unknown spots. Superposition of spots. -- Variation in degree of unsaturation by one double bond is roughly equivalent to variation in chain-length by two methylene groups and overlapping spots represented by equivalent materials may result. Therefore, a mixture of palmitic and oleic acids, for example, cannot be accurately analyzed chromatographically.

Chain-length analysis. -- Hydrogenation and subsequent chromatographic analysis (for chain-length alone) coupled with analysis of the unhydrogenated material partially compensates for superposition. A microhydrogenation method is given.

Special Experiments

Chromatography at low temperatures. -- Variation in temperature effects a non-interconsistent change in R_f values between saturated and unsaturated components. Producing chromatograms at various temperatures partially overcomes the problem of superposition. Techniques for carrying out low temperature experiments are discussed.

Autooxidation. -- Experiments are cited which determine the degree of autooxidation during migration of unsaturated materials. Carbon 14-labeled methyl esters were used and it was found that appreciable autooxidation occurred during the normal migration time.

Quantitative paper chromatography. -- Chromatography of oleic acid glycerides is discussed as it relates to the determination of impurities present. Solvent systems are: acetic acid/water (85/15), tetrahydrofuran/water (60/40), chloroform/methanol/water (25/75/5) and carbon tetrachloride/methanol/water (25/75/5).

Chromatographic analysis of menhaden oil. -- Chromatographic analysis is used as an index of purity of hydrogenated and distilled fractions of methyl esters from menhaden oil. Possible evidence for odd-chain-length esters is discussed. The analysis is also discussed with regard to distillation of unsaturated methyl esters.

The production of a neutral fish meal that can be incorporated into food has been the subject of extensive experimentation for years in the laboratories of many countries. The main difficulties encountered in this project may be summarized as follows: (a) to remove the last traces of fishy taste and odor, and to obtain a product in which these properties do not reappear during storage; (b) to find methods in which the processing does not reduce the biological value of the protein; and (c) to carry out industrial production on an economical basis.

Packaging for tropical consumption. -- An important problem in the marketing of cured fish products in tropical areas is to find a sufficiently cheap, yet efficient, packing material. Temperature, humidity, and insect attacks all have to be taken into account. Dried fish products may be protected from the effects of humidity and oxidation by storing in polyethylene containers, but this does not insure against insect attack. Insecticides are a possible solution here.

Summary and conclusions. -- It was decided that the working group should concern itself with the problems of the manufacture of unsalted, dried, or smoked and dried, whole herring products, similar to the dried bonga that is popular in the Guineas and Congo. Evidence collected indicates that such products could be manufactured from European surplus herring. Most promising, from both a technological and a marketing point of view, is dried, or dried and smoked, whole, unsalted herring. These probably could be marketed readily in many African countries if the price were no more than about 1 shilling per pound.

Fish sauces that are higher in protein and lower in salt content than those used in East Asia are possible products for introduction outside the areas of South China and Java. The working group decided to explore the possibility of using herring meal as a raw material for the manufacture of fish sauce.

In most countries, dried fish in the form of fish meals appeared to be the most acceptable product. The dried fish are usually cut up into small pieces or powdered before being incorporated into cereal dishes. Fish in the form of flour would not be difficult to use in the traditional dishes. Because the preference is for a strongly flavored product, a deodorized fish meal is neither required nor desired in these areas.

($C_{17}-C_{19}$). It is evident that a good separation may be obtained with this fraction at 215°C.

Figures 4 and 5 give the results for the oxidized esters of linolenic acid at 200°C and 240°C, respectively. The most prominent peak in each diagram is methyl azelate. The multiplicity of peaks in the diagrams was not anticipated.

Difficulty was experienced in the separation of some mixtures of esters of mono- and dicarboxylic-acids since, as in the case of a fraction in which the esters differed by three carbon atoms, the retention times were too close for satisfactory separation.

The results of this paper indicate that gas-liquid partition chromatography is a sensitive method for the study of vegetable oil oxidation.

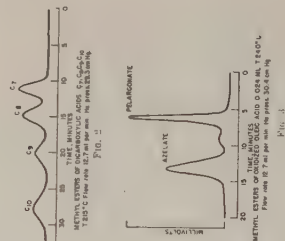


Fig. 4

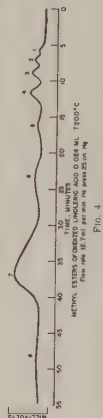


Fig. 5

heavy metals such as copper. The bath or heater must be calibrated by checking the temperature of a sample in each tube under the specified conditions including aeration.

Experimental procedures. -- Specific instructions are outlined in regard to apparatus, reagents, cleanliness of samples, aeration of tubes, sampling, procedures, notes, and precision. The committee found that an aluminum block, which utilized thermostatically controlled electric heat, had certain distinct advantages. These advantages, however, did not result in the exclusions of other methods of heating. Detergents found satisfactory for cleaning glassware were Alconox, Dret, and Vel.

Fat samples should be (1) stored only in clean glass containers, (2) protected from heat and air, and (3) analyzed immediately once the container has been opened. Reagents are taken on liquid samples (not more than 10 degrees above the melting point of fats) in duplicate and plotted against their respective aeration times in hours on rectangular co-ordinate paper. The minimum hours at which a straight line connecting these points crosses the 195 millivolt equivalent is the A. O. M. stability value. The coefficient of variation or the standard deviation expressed as a percentage of the A. O. M. value is approximately 1.34 percent. This signifies a maximum variation of plus or minus 25 on a 100-hour sample, and plus or minus 2, 5 on a 10-hour sample.

LABORATORY METHOD OF OBTAINING UNSATURATED FATTY ALCOHOLS FROM FISH OILS

Gruger, Edward H., Jr. (U. S. Fish and Wildlife Service, Seattle 2, Washington) *Commercial Fisheries Review* **18**, 1-5 (August 1957)

Research on fish oils is being conducted at the Seattle Technological Laboratory of the U. S. Fish and Wildlife Service. The aim is to develop new industrial products.

The fatty acids of fish oil are unique in two respects: (1) they have, on the average, molecules of greater chain length than have the other common commercial oils, and (2) the fatty-acid molecules of fish oil have a greater concentration of highly unsaturated constituents than have those of other common oils.

Two avenues of approach are open in the development of new products. The high degree of unsaturation can be used either to obtain products that cannot be prepared from other commercial oils, or to develop products that retain the available high degree of unsaturation. Epoxy fatty acids are an example of the first type and polyunsaturated fatty alcohols, of the second.

Much of the research at the Seattle laboratory has been of the latter type. Many paints and lacquers rely on polymerization through unsaturation of this type to form films.

Experimental work.--A method for the sodium reduction of menhaden oil (Pryde, 1951) was carried out on the methyl esters of pure fatty acids and then applied to the natural triglycerides of sardine oil. This method was found to have a number of disadvantages: a method involving the use of lithium aluminum hydride, however, appears to have overcome the disadvantages of the sodium-reduction process. No description is given for the procedure used for these reductions.

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4, 29 STUDIES ON THE CONJUGATED FATTY ACIDS. PART II. THE THERMAL POLYMERIZATION OF THE CONJUGATED FISH OIL OBTAINED BY THE NICKEL-ON-CARBON CATALYST ISOMERIZATION

Tauchiya, Yaehukiko and Kayama, Mitsuo (Tohoku University, Sendai, Japan) *The Tohoku Journal of Agricultural Research* **7**, 277-289 (January 1957)

Nickel-on-carbon catalysts made with various kinds of activated carbon were prepared for use in the isomerization of fish oil to its conjugated forms. A catalyst made with Nuchar type carbon gave the most favorable results. Activation for one hour at 350° C. and isomerization for three hours at 170° to 180° C. were adopted as adequate for the preparation of conjugated fish oils. Although a high degree of isomerization was obtained through the use of a nickel-on-carbon catalyst made with Nuchar C-190-N activated carbon, the specific extension coefficients of the oil were less than one-half of the extension coefficients of a conjugated fish oil prepared by alkali-isomerization.

Conjugated fish oils obtained in this manner were thermally polymerized in a three-necked flask under nitrogen at 370° C. Considerable rapid polymerization that resulted from conjugation already present was observed in the conjugated oil, which showed a large increase in viscosity and a rapid decrease in hydrogen iodine value and specific extinction coefficients. The thermal polymerization of nonconjugated oils was believed to occur as a result of thermal conjugation followed by a Diels-Alder addition. A rapid increase in the specific extinction coefficients of nonconjugated oil at an early stage in polymerization clearly proved this mechanism.

As a result, the conjugated oils react more rapidly than the nonconjugated oils during polymerization. A difference in the relative rates of polymerization between conjugated and nonconjugated oil can be explained by the rate determining step of conjugation-isomerization and the following Diels-

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ABSTRACTER: Martin Heerd

FISH-OIL FRACTIONATION

CATALYST FOR OIL ISOMERIZATION

LIPIDS AND THE PROBLEM OF ATHEROSCLEROSIS: A SURVEY

Morton, R. A. (Department of Biochemistry, The University, Liverpool) *Journal of the Science of Food and Agriculture* **8**, 445-457 (August 1957)

In the U. S. A. in 1950 to 1951, cardiovascular disease caused more than half the total deaths, and arteriosclerosis and hypertension accounted for 9 out of 10 deaths from cardiovascular disease.

As this review is mainly for nonmedical people, the following notes are useful:

Elastic arteries such as the aorta and the pulmonary artery contain elastic tissue, which tends to change with advancing years. The inner layer (tunica intima) facing the blood is made up of a single layer of cells like a mosaic, whereas the thicker tunica media is made of elastic tissue or muscle tissue, depending on the type of artery. The tunica media is thinner in veins.

Arteriosclerosis, a term first used by Lobstein in 1833, covers several conditions that produce a thickening of the vessel wall. Since then, the word has been applied to all conditions or lesions of arteries. Arteriosclerosis was first used by Marcellus in 1900 for the morbid lipid accumulation in the intima (Greek athero = fat). Particular lipid-laden intimal plaques shown characteristically in many aged persons' post-mortem examination reveals extensive calcification of arterial lesions, almost always of long standing. The words atheroma and atherogenesis apply to the lipid infiltration and its causation. In international medical statistics, arteriosclerosis includes (a) diseases of the coronary arteries and angina pectoris, (b) intercranial diseases of vascular origin such as cerebral arteriosclerosis and (c) the renal atherosclerosis of chronic nephritis. A thickening of the artery could reduce its effective diameter just as scale formation can reduce the effective diameter of a water pipe, and high blood pressure (hypertension) is part of the total picture of cardiovascular disease. Clot formation (thrombosis) may block a vessel (embolism, infarction),

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ABSTRACTER: F. Bruce Sanford

THE EFFECT OF DEHYDRATED ALFALFA MEAL, DRIED BREWERS YEAST, AND CONDENSED FISH SOLUBLES ON THE REPRODUCTIVE PERFORMANCE OF TURKEYS

Feldman, G. L.; Atkinson, R. L.; Creech, B. G.; Ferguson, T. M.; Reid, B. L.; and Couch, J. R. (Texas A. and M. College System, College Station) *Poultry Science* **36**, 782-787 (July 1957)

Purpose.--The effect of dehydrated alfalfa meal, condensed fish solubles, and dried brewers yeast on the reproductive performance of Broad Breasted Bronze turkeys was studied.

Experimental.--One hundred and thirty-six Broad Breasted Bronze turkey hens that had been reared on the range were divided at random into 8 groups of 17 birds each. Each group was maintained in a 14- x 14-foot pen on 4 inches of clean, crushed cane litter. Toms of the same stock were (1) used to make individual pen matings, (2) rotated weekly, and (3) replaced every 4 weeks. The hens also were artificially inseminated twice during the first 2 months with pooled semen from toms of the same stock. Eight nests were placed in each pen, and feed and water were fed ad libitum.

The basal diet contained 33.5 percent ground yellow corn, 34 percent ground milo, 25 percent soybean-oil meal, 3.5 percent calcium phosphate, 3.5 percent ground oyster shell, 0.5 percent salt, and on a per pound basis: 160 milligrams (mg.) manganese sulfate, 2 mg. 2-methylanthracene, 2 mg. riboflavin, 12.5 mg. calcium pantothenate, 40 mg. niacin, 500 mg. vitamin A (as a quinine), 5 mg. penicillin, 20 mg. chloramphenicol, 8 micrograms (mcg.) streptomycin, 12.5 mg. vitamin B₁₂, 1,200 I. U. vitamin D₃, and 20 mg. D-calciferol. Supplementations to the basal diet were made at alternate 14-day intervals (see over) and at the expense of soybean-oil meal and ground yellow corn so that the calculated protein level remained the same for all 8 groups.

Eggs were gathered twice daily and stored at 55° F. Settings were made once weekly. All eggs (over)

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ABSTRACTER: Martin Heerd

LIPIDS AND ATHEROSCLEROSIS

FISH SOLUBLES FOR TURKEYS

Alder addition, and by considering the effect of cis and trans isomers on the diene activity of conjugated isomers.

were candled at 7, 14, 21, and 24 days of incubation. The embryo in eggs that failed to hatch was examined to determine the approximate time of death.

Results.--The hatchability of fertile eggs from hens that received diets supplemented with condensed fish solubles in combination with either dehydrated alfalfa meal or dried brewers yeast was observed to be slightly higher than that of eggs from hens fed the unsupplemented basal diet or those diets not supplemented with fish solubles, table 1 (see below). The data in table 1 also indicate that unidentified factors found in the dehydrated alfalfa meal, condensed fish solubles, and dried brewers yeast are necessary for the continued maintenance of the hatchability of turkey eggs after the 12th week of the laying period.

Table 1.--Effect of dehydrated alfalfa meal, condensed fish solubles and dried brewers yeast on the hatchability of Broad Breasted Bronze turkey eggs

Group No.	Supplement	0-11 weeks			12-17 weeks			12-24 weeks		
		Total eggs set	Hatch-ability ¹	%	Total eggs set	Hatch-ability ¹	%	Total eggs set	Hatch-ability ¹	%
1	None	428		75.0	182		24.8	352		36.9
2	5% Dehydrated alfalfa meal	525		82.9	161		62.2*	311		55.9
3	10% Dehydrated alfalfa meal	562		77.5	187		63.0*	284		67.0*
4	5% Condensed fish solubles	478		75.9	120		73.5*			
5	5% Condensed fish solubles + 5% dehydrated alfalfa meal	673		83.8	208		78.0*	378		73.3*
6	5% Condensed fish solubles + 10% dehydrated alfalfa meal	558		82.9	194		71.2*	300		62.4†
7	5% Dried brewers yeast	593		74.4	200		64.1*	383		57.9
8	5% Dried brewers yeast + 5% condensed fish solubles	593		84.6	254		78.6*	482		74.5*

¹ Percent of fertile eggs. † Significant at .05 level. * Significant at .01 level.

A means of obtaining highly unsaturated fatty alcohols in concentrated form has been developed by using low-temperature fractional crystallization followed by fractionation of urea-inclusion compounds.

Fractional distillations, performed at about 1.0 millimeter mercury pressure are not successful for collecting higher unsaturated fatty alcohols. The low yields caused by polymerization indicate that in order to distill polyunsaturated fatty alcohols, one must distill at pressures nearer to those used for molecular distillations.

such as the coronary artery.

Heparin is a natural anticoagulant (made in the mast cells) and apparently varies in potency with the species from which it is prepared. It is a mucopolysaccharide (containing glucuronic acid, glucosamine, and sulphuric acid ester groupings), and it interferes in more than one way in the complex system that determines whether blood does or does not clot. Heparin plays a part in the normal 'clearing' process whereby the temporary fat enrichment of blood (alimentary lipaemia) is made to disappear.

Elastin is the name given to an insoluble fibrous protein characteristic of elastic tissue, which can be altered and solubilized without liberation of amino-acids, by an enzyme elastase, known up to the present only as a constituent of islet tissue in the pancreas.

The subjects discussed by the author are the following: epidemiology, role of dietary fat, role of cholesterol, lipoproteins, lipoproteins and lipase, role of elastin, cardiovascular disease and hormones, and effect of composition of fat.

The author concludes that there are many aspects of the lipid-lipoprotein-cholesterol-essential fatty acid-atherosclerosis complex of problems and the conscientious student of the literature often is tempted to seize upon one aspect as the answer to these problems.

If the realities of cardiovascular disease make it necessary to reach an interim verdict, the author suggests the following: (1) that given more research, a rational preventive approach may emerge, (2) that a significant reduction in fat intake is probably desirable for most men and for older women in the country, and (3) that the food industry should explore without delay how best to use animal and vegetable fats separately or together.

This article gives 102 references.

6. 84 FISH SCALES CAN BE USED IN FEED, RESEARCHERS REPORT

Anonymous
Feedstuffs 29, 98 (September 14, 1957)

Introduction. --Until recently, fish scales have presented a serious waste disposal problem. During fish filleting operations, the scales that are removed by the mechanical scalers often are allowed to settle to the bottom of the harbor. Fish scales do not decompose readily. They can become a source of harbor pollution and cause other harbor problems if they are allowed to accumulate in large quantities.

According to Dr. Gideon E. Livingston of the University of Massachusetts, fish scales can be used in animal feeds. If they are added in the proper ratio, the fish scales do not detract from the nutritional value of an animal feed or have any adverse effects on animal growth. These findings were obtained by feeding laboratory animals with scales from ocean perch and herring along with other fish wastes commonly used in animal feeds.

Problem studies. --Heretofore, information about the food value of fish scales has been lacking. Their poor drying and milling characteristics also have restricted their use as an ingredient of animal feeds. These objections to the use of fish scales were studied as a part of the project at the University of Massachusetts. Two possible methods were tried for use in the preparation of fish slurry for animal feeding. In method 1, the scales were digested with chemicals; and the resulting slurry was dried to form a cake that was ground into powder. Assays of this powder revealed a product that had less nutritive value than the raw scales. Method 2, for the preparation of fish scales, made use of a procedure in which small amounts of the scales were added to meal made from other fish wastes. This method proved to be the more successful of the two.

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7. 80 FIELD TESTING PROGRAM STARTS ON NEW THAW INDICATOR

Anonymous
Food Packer 38, 32 (August 1957)

A device that is undergoing final testing is an indicator to be used in frozen-food packing cases to check on temperature from the time the food is packed until it is unpacked at the retail outlet. If the temperature rises above a desired point, the indicator changes from yellow to red according to the following schedule:

Time-temperature integrals of indicator		
Each indicator unit can be used only once. It will not respond to high temperature until it has been subjected to the low temperature of a freezing room. The indicator can be shipped and handled in storage until used with few precautions, but should be kept at temperatures between 40° and 60° F. until activated.		
Color Change Start	Color Change Complete	Color Change Complete
10°	1200 min.	6500 min.
20°	30 min.	250 min.
30°	7 min.	11 min.
40°	4 min.	8 min.

Laboratory tests have been completed on the indicator; field tests are now in progress. From these, more detailed recommendations may be made on how the indicator should be placed in the shipping carton. The present recommendations call for placement inside the carton against the inner wall. This position corresponds roughly with the temperature of the outside of the food packages nearest the carton wall.

A single indicator without periodic checks can give only two pieces of information: (1) Either (over)

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FISH SCALES FOR ANIMAL FEEDING
TASTE TEST PANELS

7. 80 TASTING TESTS ON FOODS
Christie, E. M. (Division of Food Preservation and Transport, C. S. I. R. O., Hombush, N. S. W.)
Food Preservation Quarterly 17, 38-41 (September 1957)

The physical and chemical examination of food, although objective and not affected by personal idiosyncrasies, is not the most effective means of assessing many qualities, such as flavor, in which food scientists and processors are keenly interested. Such qualities can best be assessed by tasting, which is now accepted as a sensitive technique for examining food products.

Facilities at Hombush, New South Wales. --Tasting tests play such an important part in the researches of the Division of Food Preservation and Transport that they are conducted under the supervision of an officer trained in science and dietetics, in a specially designed and equipped room. The room is divided into three sections: a kitchen and preparation section, the tasting booths, and an office with entrance hall. The plan is shown on the back of this card.

The kitchen and preparation section is equipped with a stove, an electric dishwashing machine, a double stainless-steel sink, and a food heater for hot servings.

The six tasting booths are separated from the rest of the room by a partition reaching from floor to ceiling. Food samples are served in individual portions, and each sample is passed through a hatch to the taster in his booth. The paint in the booths is pale grey and white, neutralizing the taste. The booths are designed to reduce the judgment of the tasters' minds. Although most of the tasting is done under normal light conditions, facilities are available for using the light of color-matching fluorescent tubes, or artificial light of various colors.

Tasting panels. --Two types of tests are being made at present: (1) A pilot consumer test in which (over)

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7. 89 DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS
IN OYSTERS COLLECTED IN POLLUTED WATER

Cahnmann, H. J. and Kuratsune, Masanori (National Institutes of Health, Bethesda, Maryland)
Analytical Chemistry 29, 1312-1317 (September 1957)

Barnacles are known to take up polycyclic aromatic hydrocarbons from polluted water. For this reason, it was of interest to determine if other marine animals, especially edible types living in a polluted environment, also contain such hydrocarbons.

The nonspoilable material in the extracts from oysters collected in a moderately polluted area was chromatographed repeatedly on columns containing various adsorbents. The adsorption spectra of each elute fraction was determined and the hydrocarbons present in each were identified. Identification was based on a comparison of the spectra obtained with the spectra of authentic samples of pure hydrocarbons determined under identical conditions.

The approximate amounts of polycyclic aromatic hydrocarbons determined in the extract of 5 kilograms of shucked oysters are given in the following table:

Compound	Approximate amount in micrograms
Benzofluoranthene	5-25
Benzofluoranthene	10-30
Benzofluoranthene	10-30
Benzofluoranthene	50
Benzofluoranthene	40-60
Benzofluoranthene	100

(over)

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ABSTRACTER: Herman S. Groninger

NEW THAW INDICATOR
CHEMISTRY OF POLLUTED OYSTERS

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as many tasters as possible, usually 30 to 40, take part. The taster gives his opinion of the various qualities of the food under test; for example, flavor, color, and general acceptability. People who dislike or do not normally eat the foods under test are not used in these panels. (2) Analytical tests for which the panels consist of 8 to 12 people selected for their ability as tasters of the food under examination. In order that a suitable panel may be selected, preliminary runs are made with many more tasters than are needed; those who obtain consistent results in close agreement with the panel average are chosen. Taste tests are held on dates based on that given by Girardot, Feiryam, and Shapiro (1952).

Taste tests are held at 10:15 a.m., 12 noon, and if necessary at 3 p.m. It is undesirable, for obvious reasons, to arrange tests immediately before or after meals. Each test takes 2 to 5 minutes, depending on the taster and the number of samples.

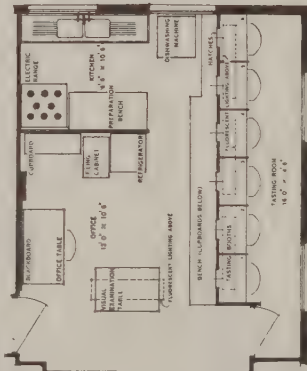
At the beginning of each series the tasters are told of its probable duration, which may be from two days to five weeks. They are given a score sheet and instructions on the nature of the test, and in case of analytical tests, some preliminary training. Each taster carries out his test independently, and discussion of results before the conclusion of a series is discouraged.

The number of samples presented per taste session varies from two to eight, depending on the nature of the food and the intensity of the examination. When food is to be ranked for general quality only, a taster can cope with two sets each of four samples in one session; but when several characteristics (color, flavor, and texture) are to be scored on a point scale, he cannot deal with more than from three to five samples in a session.

8, 84

Feed studies.—Ocean perch scales were successfully fed in amounts representing as much as 25 percent of the diet protein obtained from a mixture of fish scales, fish meal, and other proteins. Herring scales were successfully fed in amounts representing as much as 30 percent of the diet protein obtained from a mixture of fish scales, fish meal, and other proteins.

Ocean perch contain by weight 1 percent of edible fillets, and 75 percent of fillet waste. According to the author, these scales could be used in the ratio in which they naturally occur in the manufacture of fish meal from fillet waste or from whole fish.



Plan of taste test room at C.S.I.R.O., Hawthorn.

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Compound	
Chrysene	
Pyrene	
Fluoranthene	

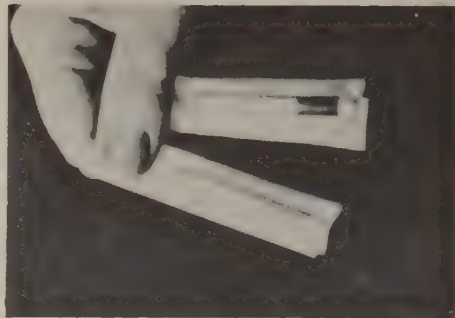
Approximate amount in micrograms

100-200
500-800
3000-5000

Since the amounts of these compounds that were obtained from barnacles varied with the habitat, it can be assumed that the quantities in the oyster will vary with their habitat. The significance of the quantitative results of this paper, therefore, cannot be evaluated until oysters from several locations have been analyzed. The present investigation shows that oysters like barnacles are able qualitatively to take up polycyclic aromatic hydrocarbons from polluted water.

7, 80

the temperature has been above a certain time-temperature integral, or it has not. (2) If the time-temperature integral is on the border line of safe and unsafe food, the indicator will show whether the food is still good, but it will not show how far deterioration may have progressed.



Indicator before and after change. Red color on right shows pre-determined time-temperature level has been exceeded.

8. 8 CHEMICAL CHANGES OCCURRING IN COD MUSCLE DURING CHILL STORAGE AND THEIR POSSIBLE USE AS OBJECTIVE INDICES OF QUALITY
Shewan, J. M. and Jones, N. R. (Torry Research Station, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 5, 481-488 (August 1957)

Introduction. --This paper reports on the chemical changes that occur in the muscle extractives of cod as a result of (1) autolysis and (2) bacterial spoilage during storage in ice at 0°C, and examines the extent of these changes as objective indices of quality.

Composition of fresh cod. -- Newly caught cod muscle averages 81 percent water, 15 percent protein, 1.5 percent extractives, 1.5 percent ash, and 0.2 percent fat. The extractives are composed of a heterogeneous mixture of nitrogenous compounds such as lower amines and trimethylamine oxide; free amine-amide such as taurine and glycine; simple phosphates such as aspartate and glutamate; purines and purinic derivatives; and carbohydrates such as glycogen and glucose. These extractives play an essential role in muscle metabolism and almost certainly provide the flavor constituents in fresh fish as do their products of decomposition in spoiled fish.

The important relative amounts of the extractives in cod muscle are: creatine 400 milligram-percent, trimethylamine oxide 350 milligram-percent, taurine 300 milligram-percent, and aspartate 150 milligram-percent. Other free amino acids account for 7 milligram-percent, whereas the purine derivatives probably account for 200 milligram-percent. Lysine varies from a maximum of 13 milligram-percent in January to nil in April to May because it is linked with the mobilization of the muscle lysine for the formation of milt and roe during spawning. Taurine varies from 140 milligram-percent in January to 450 milligram-percent in June to July. Trimethylamine oxide is at a maximum in June to July and at a minimum in September to October. Freshly killed cod muscle also contains 39 milligram-percent glucose and 10 to 60 milligram-percent glycogen.

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ABSTRACTER: Martin Heerdt

8. 8 PILOT PLANT OPERATIONS ELIMINATE QUALITY ERRORS

Gould, Wilbur A. (Ohio State University)
Food Packer 38, 22 (August 1957)

In a well designed and properly operated pilot plant, one of more production variables can be controlled accurately for the guidance of production-line operations. Processing characteristics and quality attributes also may be studied and evaluated under closely controlled conditions.

A pilot plant should be designed for batch or continuous processing of small quantities. Standard food-processing equipment may be used for this purpose, although "scaled-down" models of certain machines often are available. The pilot plant design must be flexible in machinery and controls, for methods of processing, and for the material in process.

Careful planning must go into each unit from the standpoint of construction, materials, and design, placement and use of controllers and recorders, and methods of collecting data. The pilot plant should be a research tool to benefit the quality control, production, and sales divisions. It definitely should not be the property of any one of the above divisions alone.

Some of the many advantages of a pilot plant are: (1) small quantities of a product may be studied effectively; (2) subjective errors are eliminated; (3) specific techniques or a new process may be developed; (4) single or multiple variables may be studied; and (5) employees may be trained or demonstrated given with this equipment.

Two disadvantages encountered are: (1) only comparative data can be obtained for yields and costs, and (2) the pilot plant cannot be used economically as a production-line operation.

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ABSTRACTER: Kathryn L. Osterhaug

CHANGES IN ICED COD

PILOT PLANT OPERATION

9. 11

PROBLEMS OF ATOMIC WASTES CONFRONT FISHERIES SCIENTISTS

Finn, D. B. (Fisheries Division, FAO, Rome, Italy)
Western Fisheries 54, 21, 23, 44-46 (August 1957)

At present, only Canada, Russia, the United Kingdom, and the United States, actually, are disposing of any substantial quantity of radioactive wastes, but other nations soon will be doing the same.

Nuclear fission undoubtedly will be a very important source of industrial and domestic power in the future, and the radioactive wastes will have to be disposed of somewhere. The oceans are the most obvious places to dump this material.

The United States and the United Kingdom are disposing of radioactive wastes in their adjacent seas under very rigid and exacting safety controls. As far as is known, no dangerous concentration of radioactivity has taken place in the disposal areas. With the rapid growth of atomic-energy utilization, it must be assumed that greater quantities of radioactive wastes will be dumped in coastal waters. The questions to be answered are: how, where, and how much radioactive waste can be disposed of in these waters without danger?

The disposal of radioactive wastes is today a subject of great importance to oceanographers, biologists, and other scientists of the world. The sea has natural radioactive properties. It contains such elements as potassium 40, ionium, radium, and uranium. The natural radioactivity of the oceans is, however, only about one-tenth of the natural radioactivity on land. Fish and other living organisms in the sea concentrate radioactive elements in their bodies. The concentration in living tissue may be from 1,000 to 100,000 times greater than in an equal amount of sea water.

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ABSTRACTER: Kathryn L. Osterhaug

9. 4 THIS FISHING IS A FAMILY AFFAIR

Green, George W.
Canner and Freezer 125, 13-16, 27 (August 5, 1957)

A Wheatley, Ontario fishing company is operated by seven brothers. The close cooperation and diverse abilities of the family have made the operation unique in the industry.

The plant. -- Present facilities extend over 40,000 square feet. At the peak season, during the smelt run in March and April, 400 persons are employed. The operation at Wheatley encompasses fishing, boat operation, processing fresh-frozen, frozen, and cooked fish, as well as byproducts. The pressure plate freezing units in the plant can handle 50 tons of fish per day.

The raw product. -- There are four major sources of fish: (1) catch from the four company-owned boats; (2) catch from independent fishermen; (3) fish from other areas along the lake; and (4) frozen blocks of haddock filets from New Foundland.

Upon delivery, fish are graded and either taken in for immediate handling or repacked with ice in 50-pound wooden boxes and stored at 34°F. to await future processing. At the peak of the smelt run, the company-owned boats, alone, bring in 30 tons of smelt a day. Some is processed immediately but the bulk is frozen for later use.

The firm operates a 100-by-160-foot cold storage warehouse, both for its own use and as a public facility. An additional unit of the same size is being built.

Processing the catch. -- Twelve scaling machines feed three stainless-steel processing lines by means of conveyors. On the processing lines the fish are dressed and inspected. About 20

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ABSTRACTER: Richard W. Nelson

ATOMIC-WASTE DISPOSAL

CANADIAN FISH PROCESSOR

8. 8

A pilot plant may be used strictly for research on new product development, or it may be used to determine the practicality of a new instrument or machine. Furthermore, it may be used in an industry or at a university or government laboratory.

The pilot plant also can be used for various types of research. A few examples are: (1) grade-relationship studies, (2) evaluation of new species, (3) study of new quality-control techniques, and (4) development of new products, which may involve procedures of manufacture, machinery, formulations, or process variables.

For successful operation of a pilot plant, there must be clearly defined objectives for each study. Also, there should be a competent operator to insure the uniformity of each operation.

Obviously, this also implies the selection of a well-trained technologist to coordinate and direct such a program. The director of the pilot plant must understand each unit operation individually and in combination, as well as the explicit details of conducting a research program. The best pilot plant is no assurance of a successful program without the direction of a trained technologist in this area of work.

A pilot plant can be a big asset to the quality-control department for studying the effects of machines, materials, and methods on the quality of the finished product. It can be used to set up standards of efficiency of performance for each unit operation. It also can be used to set quality-control limits. Furthermore, it can be used to establish and test new processes that might lead to higher quality in the finished product. The old axiom "Make your blunders on a small scale and your profits on a large scale" is most fitting.

8. 8 (Cross Reference: 1. 51)

Experimental. -- Extensive use was made of two-dimensional paper chromatography for chromatographing chloroform-separated, 80 percent ethanol-soluble extractives after concentration by freeze-drying.

Results with autolytic changes. -- Serial chromatograms showed little change in most of the free amino acids during storage at 0°C. Glycine remained unchanged, alanine and lysine both decreased in amount, and glutamic acid increased by over 300 percent. Taurine was unaffected by autolysis as was creatine, creatinine, and trimethylamine oxide. Anserine disappeared and gave rise to its constituent amino acids, 1-methylhistidine and β -alanine. The nucleotides, nucleosides, and other purine derivatives appeared to undergo considerable change. Glucose was present only in traces after 5 days, whereas ribose increased from a trace to about 4 to 5 milligram-percent after 12 days and to about 6 to 7 milligram-percent after 21 days.

Results with bacterial spoilage. -- Losses were incurred in all of the major nitrogenous constituents. The loss of taurine was mainly due to leaching, whereas the loss of creatine was due to leaching as well as attack by bacteria. Trimethylamine oxide was attacked by marine bacteria and trimethylamine resulted. Trimethylamine oxide also was subject to loss by leaching with water. The remaining free amino acids in spoiling cod muscle showed a slight decline during the first few days, an increase until about the tenth day, a decline thereafter, and then a stationary level. Lysine increased steadily, particularly during the first 10 to 12 days. Glucose disappeared by the 10th to 12th day, whereas ribose increased steadily until the 10th day and then began to decrease, probably as a result of leaching and bacterial action.

Results with sensory quality. -- A taste panel trained to assess the appearance, odor, and texture of the raw cod and the odor, flavor, and texture of the cooked cod, found that fresh cod go through four distinct categories of change from fresh to putrid during storage in ice. Cooked cod, in contrast, go through 9 or 10 categories of change. Steamed fish that originally had a raw odor score of 4 was usually declined by the taste panel; therefore, edibility could be defined by the raw odor score. The grassy, slightly sweet, fruit odor of this fish would be described as characteristic of acetic or butyric acids. The raw odor scores for categories 1 to 4 were, respectively: 10 to 14, 7 to 6, 5 to 4, and less than 4. These scores corresponded, respectively, to storage in ice for approximately 0 to 6, 7 to 10, 11 to 15, and more than 15 days.

9. 4

percent of the fish are packaged and 95 percent of these are exported to the United States.

Packaging and freezing. -- The fish to be frozen is packaged in 12-ounce, one-pound, and five-pound packages. It is frozen with pressure plates at -40° to -50° F.

Infra-red cooking. -- Infra-red is used to cook fish sticks prepared from New Foundland haddock. The oil required for cooking is sprayed on the fish sticks. The fish sticks are normally under infra-red from 3 to 3½ minutes. There are several advantages in the type of cooking. Some of these are: (1) only the oil which drips on the cooked surface is subjected to cooking temperature; (2) fat content of the product is reduced; (3) cooking oil consumption is reduced; (4) preheating the oil is eliminated; and (5) upkeep expense is low.

Animal feed. -- The fish company also produces ground and frozen fish waste for use as animal feed. This product is packed and frozen in 50-pound containers.

9. 11

The propensity of fish and living organisms to concentrate radioactive elements is one of the dangers inherent in the disposal of radioactive wastes at sea. If the radioactivity of the water were heavily increased, it could result in the death of marine life, or perhaps be sufficient to cause a dangerous concentration of radioactive elements in fish and other marine life that are eaten by man.

The problem of disposing of radioactive waste in the sea is very complex. Phytoplankton and other marine plants and seaweeds accumulate radioactivity rapidly. Fish and other marine animals could ingest these elements with food, even though the waters in which they were swimming was not radioactive.

Fish swimming through an area of high radioactivity may become contaminated and then be eaten by higher fish hundreds of miles from the contaminated waters, thus passing on their radioactivity. Fish that migrate, or that live part of their lives in fresh water and part in salt water, might carry radioactivity with them.

The governments already operating atomic-energy programs have put their outstanding scientists to work investigating fundamental biological and physical principles in relation to atomic energy and the question of the biological effects of atomic energy has been referred to the United Nations Scientific Committee on the Effects of Atomic Radiation. An enormous amount of research and investigation will be necessary to ensure that the right answer to the problem is found so that, as the volume of radioactive waste material grows, it can be disposed of safely.

0.34	BILE SALTS OF A COELACANTH, LATIMERIA CHALUMNAE, SMITH Haslewood, G. A. D. (Guy's Hospital Medical School, London) The Biochemical Journal 65, 22p (June 1957) Preliminary results suggest that coelacanth bile salts (i) are largely 'primitive', (ii) are very complex and (iii) contain as major constituent(s) alcohol sulphate(s) probably not having the cholic acid or farnesylpranol type of hydroxylated nucleus.	
0.34	PHOTOSENSITIVE PIGMENTS FROM RETINAS OF DEEP-SEA FISHES Munz, Frederick W. (Department of Zoology, University of California, Los Angeles) Science 125, 1142-1143 (June 7, 1957) The new pigments are named "chrysoptins" or visual golds and characterized as having maximum sensitivity to light at a wave-length about 20 mμ less than the λ _{max} of rhodopsin. The chrysoptins were not extracted from the retina, but were demonstrated by determining the density changes when fresh retinas were bleached with white light.	
0.36	THE PROBLEM OF THE TEMPERATURE DEPENDENCE OF ATP-BREAKDOWN IN THE MUSCLES OF COLD- AND WARM-BLOODED ANIMALS Partmann, W. Biochem. Z., 326, 260-269 (1955) Food Science Abstracts 29, 207 (June 1957) The rate of breakdown of adenosinetriphosphate in relation to temperature, in the range 0° to 30° C., was studied in homogenates prepared from (1) the lateral body muscle of tench (<i>Tinca vulgaris</i>) and (2) beef gastrocnemius muscle. The half-time values (in seconds) at 0°, 20°, and 30° C. were: for the fish muscle, 202, 38, and 29, and for the beef muscle, 582, 108, and 79, respectively. The temperature coefficient, Q ₁₀ , of the enzyme hydrolysis of adenosinetriphosphate was practically the same for fish muscle and for mammalian muscle in the temperature ranges 0° to 20° C. (2.3) and 20° to 30° C. (1.3, 1.4). The apyrase activity of deep-frozen fish or beef muscle was little altered during cold storage, even after 2 to 3 months.	
0.36	ALTERATIONS IN THE BLOOD LEVEL OF LACTIC ACID IN CERTAIN SALMONOID FISHES FOLLOWING MUSCULAR ACTIVITY I. KAMLOOPS TROUT, SALMO GAIARDNERI Black, Edgar C. (University of British Columbia, Vancouver, B. C., Canada) Journal of the Fisheries Research Board of Canada 14, 117-134 (March 1957) Following 15 minutes of vigorous exercise at 11.5° C. the blood level of lactic acid in yearlings increased from the unexercised level of 16 mg. percent to 100 mg. percent and then continued to increase still further during the first 2 hours of recovery to 170 mg. percent to subside in 4 to 6 hours toward the pre-exercise level.	
0.5	A NEW SPECIES OF BACTERIUM WHICH PRODUCES LARGE AMOUNTS OF HISTAMINE ON FISH MEATS, FOUND IN SPOILED FRESH FISH Kimata, M. and Kawai, A. Mem. Res. Inst. Food Sci., Kyoto Univ., No. 7, pp. 12-17 (1954) Food Science Abstracts 29, 128 (April 1957)	
0.5	A STUDY WHETHER THE BACTERIA HAVING AN ACTIVITY WHICH CAN PRODUCE A LARGE AMOUNT OF HISTAMINE, SO-CALLED HISTAMINE-FORMERS, ARE PRESENT OR NOT, ON THE SURFACE OF FRESH FISH Kimata, M. and Tanaka, M. Mem. Res. Inst. Food Sci., Kyoto Univ., No. 8, pp. 7-16 (1954) Food Science Abstracts 29, 128 (April 1957)	
0.5	TWO DIFFERENT TYPES OF ACHROMOBACTER HISTAMINE PRODUCING A LARGE AMOUNT OF HISTAMINE Kimata, M. and Akamatsu, M. Mem. Res. Inst. Food Sci., Kyoto Univ., No. 9, pp. 1-3 (1955) Food Science Abstracts 29, 128 (April 1957)	
0.5	ON THE BACTERIA CAUSING SPOILAGE OF FRESH FISH, ESPECIALLY ON THEIR ACTIVITY WHICH CAN PRODUCE HISTAMINE Kimata, M. and Tanaka, M. Mem. Res. Inst. Food Sci., Kyoto Univ., No. 7, pp. 12-17 (1954) Food Science Abstracts 29, 128 (April 1957)	
0.5	MEDIA FOR THE STUDY OF RED HALOPHILIC BACTERIA Sreenivasan, A. and Venkataraman, R. J. sci. industr. Res., India 15C, 210-211 (1956) Food Science Abstracts 29, 215 (June 1957)	
0.5	BACTERIOLOGY OF CANNED FISH--2. Riemann, Haus Food Manufacture 32, 333-335 (July 1957) (Abstract of this article appears under 3.30 page 13 - December 1957)	

2.05	ROCK LOBSTERS 2. SURVIVAL OF <i>CLOSTRIDIUM WELCHII</i> IN SEA WATER Rowan, M. K. Annual Report of the Fishing Industry Research Institute, Cape Town, South Africa 9, 17-18 (1955-1956) <i>Clostridium welchii</i> in four, 2-liter samples of sea water were studied to learn the effect of storage temperatures upon organism counts. At room temperature (62 to 65°F.) the count in sample A decreased from 26 to 0 organisms per 20 milliliters of sea water at the end of 14 days, whereas in sample B the count decreased from 25 to 1 organism per 20 milliliters at the end of 22 days. At 32°F., the count in sample A decreased from 23 to 0 organisms at the end of 14 days, whereas in sample B the count decreased from 22 to 1 at the end of 22 days.	2.9 NUTRITIVE VALUE OF FISH L₁ NICOTINIC ACID, RIBOFLAVIN, VITAMIN B₁₂, AND AMINO ACIDS OF VARIOUS SALT-WATER SPECIES Teeri, A. E.; Loughlin, M. E.; and Josselyn, D. Food Research 22, 145-150 (March-April 1957) (Abstract of this article appears under 8.0 page 15 - October 1957)
2.05	HYGIENIC EVALUATION OF THERMAL PROCESSING OF FISH PRODUCTS BY THE ENZYMIC REACTION Simskeya, A. M. and Karplyuk, I. A. (Central Post-Graduate Inst., Moscow) Voprosy Pitaniya 16, No. 2, 63-6 (1957) (English summary) Chemical Abstracts 51, 11808 (August 10, 1957) The activities of the alk. phosphatase (II) and acid phosphatase (II) in the muscles of 18 different fish species were assayed by using Ba p-nitrophenylphosphate as the substrate. The activity of II was greater than that of I. In terms of the formation of p-nitrophenol it was 0.1 to 0.4 mg. for II and 0.008 to 0.003 mg. for I. Total inhibition of II occurs after heating a fish sample at 80° for 20 min. The II test is suggested for controlling the thermal processing of fish products.	2.9 CHEMICALS AND FOOD PROCESSING Mickelsen, Olaf Nutrition Review 15, 129-131 (May 1957) (Abstract of this article appears under 6.199 page 13 - October 1957)
2.2	BACTERIOLOGICAL ESTIMATE OF THE POSSIBILITY OF REUSING ICE FOR CHILLING FISH Fischer, E. Prace Morak. Inst. Ryback, Gdyni No. 7, pp. 397-404 (1954) Food Science Abstracts 28, 562 (December 1956) The reuse of ice for the chilling of fish was not practicable, because ice which had already been used for this purpose was seriously contaminated, and washing with water, or even with hypochlorite solution, did not improve its bacteriological condition.	2.9 STUDIES ON THE RADIOELEMENTS IN THE CONTAMINATING RADIOACTIVE FISH-II. ON SKIPJACKS CAUGHT AT THE PACIFIC OCEAN IN 1956 (PART 1) Sakiti, Masamichi; Shirai, Kazuo; Ohno, Susumu; and Mori, Takairo Bulletin of the Japanese Society of Scientific Fisheries 22, No. 10, 645-650 (1957) The distribution of radioactivity and radioactive elements in two specimens of skipjacks, <i>Katsuwonus pelamis</i>, have been investigated, which were caught at a station (14°03'N, 157°28'E) in the Pacific Ocean on June 13, 1956 by the Shunkotsu-maru. These specimens were less radioactive, but more interesting than those in 1954, as they represented the more complicated patterns of contamination.
2.2	REFRIGERATION OF FISH: PART 2. HANDLING FRESH FISH Builer, Charles; Dassow, John A.; Carlson, C. J.; Carver, Joseph; and Heerd, Martin Fishery Leaflet 428, pp. 1-84 (1956) (Abstract of this article appears under 3.23 page 11 - May 1957)	3.11 EFFECTS OF ADDED SODIUM CHLORIDE, POTASSIUM CHLORIDE, CALCIUM CHLORIDE, MAGNESIUM CHLORIDE, AND CITRIC ACID ON MEAT SHRINKAGE AT 70°C. AND OF ADDED SODIUM CHLORIDE ON DRIP LOSSES AFTER FREEZING AND THAWING Wierbicki, Eugen; Cahill, V. R.; and Deatherage, F. E. Food Technology 11, 74-76 (February 1957) (Abstract of this article appears under 3.2495 page 11 - June 1957)
2.2	REFRIGERATION OF FISH: PART 2. HANDLING FRESH FISH Builer, Charles; Dassow, John A.; Carlson, C. J.; Carver, Joseph; and Heerd, Martin Fishery Leaflet 428, pp. 1-84 (1956) (Abstract of this article appears under 3.23 page 11 - May 1957)	3.11 EFFECT OF REDUCING AGENTS ON CURED MEAT COLOR Kelley, G. G. and Watts, B. M. Food Tech. 11, 114-116 (1957) Food Science Abstracts 29, 202 (June 1957) Ascorbic acid, a strong reducing agent, is known to catalyze the production of nitric oxide haemoglobin in haemoglobin solutions containing nitrite, to protect the surfaces of cured meats from fading, and to regenerate the color of cured meats after fading by light. Cysteine and glutathione were found to be about as active as ascorbic acid on a molar basis. Dihydroxyfumaric acid and dihydroxy-maleic acid were not effective; they led to the production of green or grey-brown pigments from meat pigments, suggesting the destruction of prophylin rings.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst	Gourmet
Analytical Chemistry	Industrial and Engineering Chemistry
Archives of Biochemistry and Biophysics	Industrial Refrigeration
Biochemical Journal	Institutions
Bulletin of the Faculty of Fisheries, Hokkaido University	Journal of Agricultural and Food Chemistry
Bulletin of the Japanese Society of Scientific Fisheries	Journal of Applied Chemistry
California Fish and Game	Journal of Biological Chemistry
Canadian Fisherman	Journal of Nutrition
Canadian Journal of Chemistry	Journal of the American Chemical Society
Canadian Journal of Technology	Journal of the American Dietetic Association
Canner and Freezer	Journal of the American Oil Chemists' Society
Chemical Abstracts	Journal of the Association of Official Agricultural Chemists
Chemical and Engineering News	Journal of the Fisheries Research Board of Canada
Chemical Engineering	Journal of the Science of Food and Agriculture
Chemical Processing	Maine Coast Fisherman
Chemistry and Industry	Modern Packaging
Commercial Fisheries Review	Modern Refrigeration
Drug and Cosmetic Industry	National Fisherman
FAO Fisheries Bulletin	National Provisioner
Federation Proceedings	Nature
Feed Bag (supersedes Flour and Feed)	Nutrition Reviews
Feedstuffs	Pacific Fisherman
Fisheries Newsletter (Australia)	Pan American Fisherman
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.	Poultry Science
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.	Practical Home Economics
Fishing Gazette	Progressive Fish-Culturist
Food Engineering	Quick Frozen Foods
Food Manufacture	Refrigerating Engineering
Food Packer	Report of the Food Investigation Board (Great Britain)
Food Preservation Quarterly	Science
Food Processing	Southern Fisherman
Food Research	Trade News (Fisheries Department, Canada)
Food Science Abstracts	Western Fisheries
Food Technology	World Fisheries Abstracts
Frosted Food Field	World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

4. 20 THE EXACTING PERSPECTIVES OF LIPOCHEMISTRY Sisley, J. P. and Valley, J. Rev. franc. corps gras 3, 577-87 (1956) Chemical Abstracts 50, 17475 (November 25, 1956) The successful production of the numerous products derived from fats--many of them being re-viewed in this paper--depends on the availability of extremely pure and well-characterized raw materials. The desired properties can be found in carefully fabricated and standardized fatty acids rather than in natural fats.	4. 63 ANTIOXIDANTS FOR VITAMIN A Muraoka, Kazuo, et al. Japan 1098 (February 19, 1955) Chemical Abstracts 50, 17346 (November 25, 1956) Vitamin A--contg. material is stabilized against oxidation by treatment with 0.1-0.2% gossypol or its deriva., alone or mixed with org. acids or other antioxidants.
4. 20 GLYCERIDE SYNTHESIS BY DIRECT ESTERIFICATION Hartman, L. (Department of Scientific and Industrial Research, Wellington, New Zealand) Journal of the Chemical Society (London) pp. 3572-3575 (August 1957) Glycerides of known structure have been synthesized by the use of differences in the reactivity of primary and secondary hydroxyl groups of glycerol. α-monoglycerides and α,ω-diglycerides of a single acid are prepared from acyl chlorides and maintained in homogeneous chloroform solution with the aid of NN-dimethyl-formamide. Di- or tri-glycerides containing two or three different acids are obtained by treating a mono- or di-glyceride with another fatty acid chloride.	4. 63 STABILIZING AGENT FOR VITAMIN A Yamamoto, Ryutichi and Tanaka, Hiroyoshi (to Shionogi Drug Manufg. Co.) Japan 4148 (June 2, 1956) Chemical Abstracts 51, 13324 (September 10, 1957) Fish-liver oil (100 g.) contg. 50,000 units vitamin A/g. and 100 mg. phenothiazone in 10 ml. alc. are mixed. The alc. is removed, and the oil is made into tablets with the addn. of 800 g. starch. Vitamin A palmitate (20 mg.) in 1 g. CaHPO_4 and 0.4 mg. phenothiazone retained 78% of its potency for 6 days, while the control showed all destruction of vitamin A.
4. 5 POLARGRAPHIC STUDIES ON THE RANCID FISH-OIL--II. Kikuchi, Takeaki and Okada, Ikunosuke Bulletin of the Japanese Society of Scientific Fisheries 22, No. 12, 784-786 (1957) (English synopsis, table, and figure)	6. 19 NEW DEVELOPMENTS ON UNIDENTIFIED NUTRIENTS Norris, L. C. and Morrison, A. B. Proceedings Distillers Feed Conference 11, 55-67 (March 1956) (Abstract of this article appears under 0.7 page 1 - November 1956)
4. 5 EFFECT OF CARBOHYDRATE UPON RANCIDITY IN EXPERIMENTAL RATIOS Thomson, P. and Hegsted, D. M. J. Nutr. 60, 361-365 (1956) Food Science Abstracts 29, 232 (June 1957) In diets containing casein, cellulose flour, salts, maize oil, cod liver oil, choline chloride, and water-soluble vitamins, rancidity developed much less rapidly when carbohydrate (84%) was supplied as sucrose than when it was supplied as glucose. The development of rancidity was delayed by the omission of salts, or by the addition of an antioxidant, but in both cases glucose still accelerated rancidity. A few preliminary experiments showed that omission of choline chloride markedly im-proved stability, and abolished the difference between sucrose and glucose diets.	6. 19 TOXIC PROTEIN FROM TRICHLOROETHYLENE-EXTRACTED SOYBEAN-OIL MEAL McKinney, L. L.; Weakley, F. B.; Campbell, R. E.; Eldridge, A. C.; Cowan, J. C.; Picken, J. C., Jr.; and Jacobson, N. L. (U. S. Department of Agriculture, Peoria, Illinois) The Journal of the American Oil Chemists' Society 34, 461-466 (September 1957) A specially prepared, undenatured, toxic, trichloroethylene-extracted soybean-oil meal was fractionated to determine which component of the meal is associated with the toxicity. Calf-assay of the samples showed that the toxic factor is associated with the protein and is labile to strong acid hydrolysis. Measurable destruction of the toxic factors occurs when the protein is treated with alkali at pH 11 to 12 at 60°C. Analyses of the toxic protein failed to indicate the nature of the reaction of trichloroethylene with the protein to produce the toxicity.

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7, 593	CHEMICAL COMPOUNDS FORMED DURING THE SPOILAGE OF FISH Miyachi, David T. and Malins, Donald C. <i>Commercial Fisheries Review</i> 19, 26-29 (January 1957) (Abstract of this article appears under 2, 00 page 5 - June 1957)	8, 53	FRESH FISH 1. FAT CONTENT OF HAKE Rowan, A. N. Annual Report of the Fishing Industry Research Institute, Cape Town, South Africa 9, 7 (1955-1956) On a dry basis, hake tail flesh contained 2.1 percent fat, hake nape flesh contained 1.0 percent of fat, hake tail skin contained 10.4 percent fat, and hake nape skin contained 2.1 percent fat. These figures are lower than those reported previously, e.g., 4.5 percent for the tail flesh and 1.25 percent for the flesh at the nape. The difference is possibly due to the known variations in the fat content of hake. The samples for both the present and previous tests were caught in September and October.
7, 593	ON THE QUANTITATIVE DETERMINATION OF HISTAMINE BY PAPER CHROMATOGRAPHIC METHOD Kadota, I. H. and Hayashi, K. <i>Bull. Res. Inst. Food Sci., Kyoto Univ.</i> , No. 6, pp. 30-35 (1951) <i>Food Science Abstracts</i> 29, 132 (April 1957)	8, 53	THE COMPONENT ACIDS OF SOME INDIAN FRESH-WATER FISH FATS Pathak, S. P. and Ojha, V. N. (Department of Industrial Chemistry, Banaras Hindu University) <i>The Biochemical Journal</i> 65, 193-195 (June 1957) A comparison has been made of the body and visceral fat from belgagra fish and between the body fats of Indian and British fresh-water fishes. The compositions of the body and visceral fats from belgagra (<i>Rita buchana</i>) and the body fat of hilsa (<i>Clupeonotus ilisha</i>) have been studied. Lithium salt-acetone and lead salt-ethanol fractionations were used to separate the fatty acids into groups differing in unsaturation. Their compositions were studied by methyl ester fractionation.
7, 80	RE-AIMED SENSORY TESTING AIDS FOOD ANALYSIS, FORMULATION Hasselstrom, T.; Hewitt, E. J.; Konigsbacher, K. S.; and Danker, W. H. <i>Food Engineering</i> 28, 80, 85, 95 (August 1956) Standard panel techniques that greatly speed chemical analysis of flavor constituents--then guides formulation of imitation food products, from first laboratory experiments to final production methods.	9, 125	"BROWN-SPOTTING" IN THE SOUTHERN OYSTER Fingerman, Milton <i>Commercial Fisheries Review</i> 18, 4-5 (August 1956) (Abstract of this article appears under 1, 81 page 1 - March 1957)
7, 80	SOME STATISTICAL CONSIDERATIONS IN ORGANOLEPTIC RESEARCH: TRIANGLE PAIRED, DUO-TRIO TESTS Radkins, Andrew P. (Purdue University, Lafayette, Indiana) <i>Food Research</i> 22, 259-265 (May-June 1957) The purpose of this paper is to explain and demonstrate an improved approach for determining sample size and critical regions for triangle, paired, and duo-trio tests. The calculations are made prior to conducting these tests. The use of the binomial distribution and the normal approximation to the binomial are discussed. Examples demonstrating the advantage of this procedure have been given.	9, 125	THE HORMONAL MECHANISM OF MOLTING IN DECAPODS Veillet, A.; Balesdent-Marquet, M. L.; Lenel, R.; and Vernet-Cornbert, G. (Inst. biol., Nancy, France) <i>Bull. soc. sci. Nancy</i> 14, 70-1 (1955) <i>Chemical Abstracts</i> 50, 11544 (August 25, 1956)

